V/TSDF

environmental restoration project

A Department of Energy
Environmental Cleanup Program

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TA-2
Sampling and Soil Removal
Final Closeout Report

Los Alamos
NATIONAL LABORATORY
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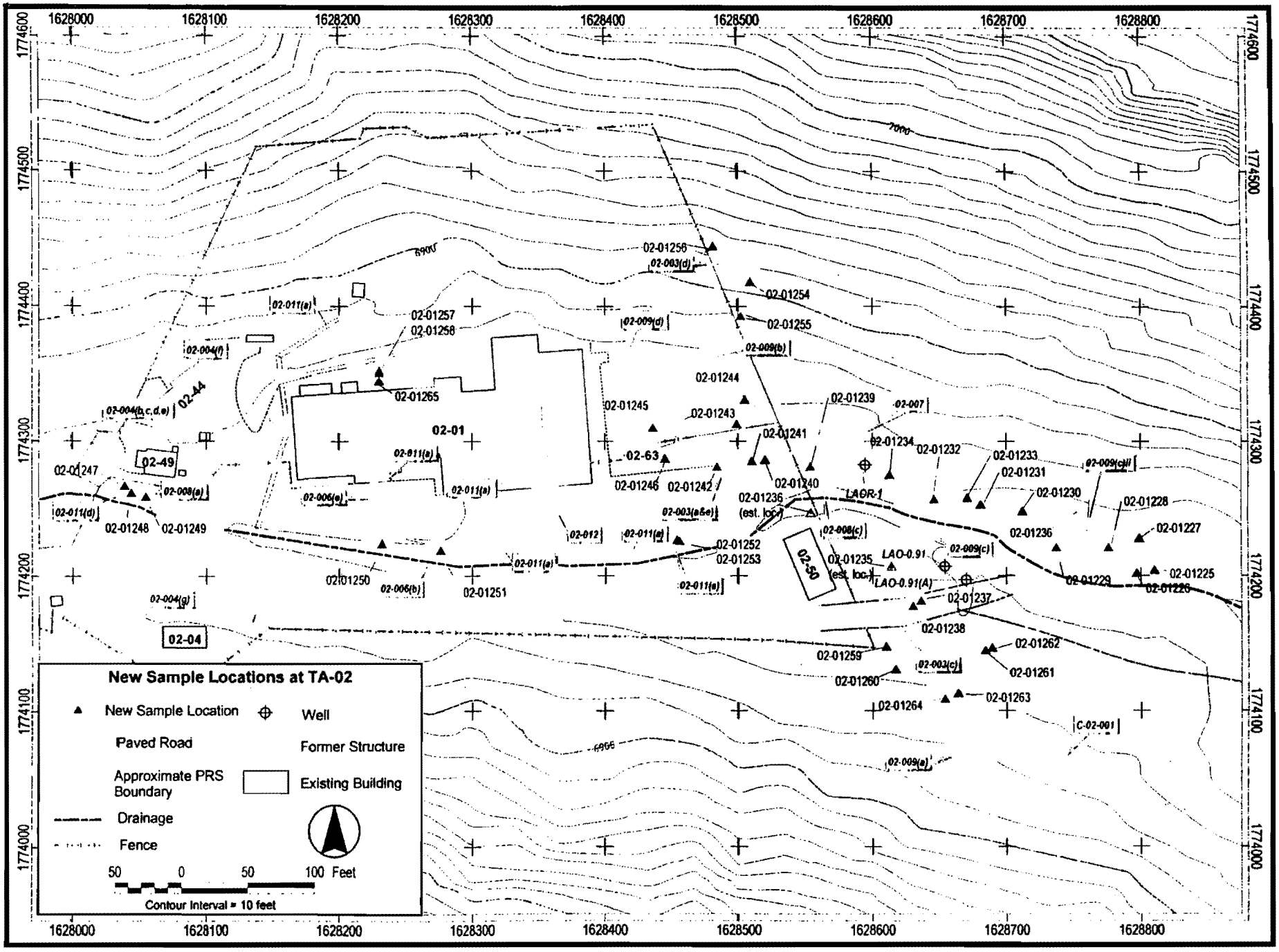
INTRODUCTION

This report summarizes work performed at Technical Area 2 as part of the Post Cerro Grande Fire Recovery Work under direction of the Los Alamos National Laboratory's (LANL) Environmental Restoration (ER) Project. Mobilization began on August 28, 2000, and demobilization completed October 11, 2000. Subsurface sampling was conducted shallow and surface samples were collected and soil removal was conducted.Site map and new sample locations are shown in Figure 1. This should be considered an interim document, since some work remains to be done in order to consider the task complete. Remaining tasks are listed in section 7 of the report.

1.0 SCOPE OF WORK

The original scope of work dated July 19, 2000 listed the following activities:

- Activity 1 Site planning, preparation and Mobilization.
  - ⇒ Complete Environmental Safety and Health Identification (ESH-ID) process for work,
  - ⇒ Prepare a Site Specific Health and Safety Plan,
  - ⇒ Complete Facility Tenant Agreements between the ER Project and Facility Management Units (FMU) 80 and 85,
  - ⇒ Complete all required field documentation for collection of surface and subsurface samples,
  - ⇒ Coordinate with drilling and other subcontractors as necessary,
  - ⇒ Coordinate with Emergency Management and Response (EM&R) and arrange for access to Los Alamos (LA) Canyon,
  - ⇒ Conduct and obtain approval on readiness review for all field work, and
  - ⇒ Mobilize all necessary equipment and trained personnel to the site.
  - ⇒ Stabilize (contour/revegetate), and construct erosion protection for the excavated sites,
  - ⇒ Write a short report documenting what was done.
- Activity 2: Perform Accelerated Action at C-02-001 "Metal Nugget Pile".
  - ⇒ Remove an estimated total 6 cubic yards or less of metal chunks and soil shall be excavated and removed from the site,
  - ⇒ Collect approximately 2 verification samples from the former location of the pile, and
  - ⇒ Recontour/stabilize the site.
- Activity 3: Collect Confirmatory Samples from Potential Release Site (PRS) 2-012
  - ⇒ Collect samples at a depth of 10 to 15 feet using a hollow stem auger drill rig at the former locations of tanks TA-2-29 and TA-2-67.
- Activity 4: collect Additional Characterization Samples at Various PRSs at TA-2.
  - ⇒ Collect additional surface samples at PRSs 2-003(a,c,d,e), 2-006(b,c,e), 2-009(b,c,d), 2-010, and 2-011(a,b,c),
  - ⇒ Collect subsurface samples from 2-003, 2-009, and 2-010, and
  - ⇒ Provide Radiation Screening Personnel (RSP) certified to perform rad screening for strontium (Sr) 90.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02-01229
02-01230
02-01231
02-01232
02-01233
02-01234
LAO-0.91
LAO-0.91(A)
LAOR-1
(est. loc.)
C-02-001
New Sample Locations at TA-02
New Sample Location
Well
Paved Road
Former Structure
Approximate PRS Boundary
Existing Building
Drainage
Fence
50 0 50 100 Feet
Contour Interval = 10 feet

- Activity 5: Site Restoration and documentation.
  - ⇒ Perform geodetic surveys of all sample locations
  - ⇒ Provide geologic logs of all subsurface locations,
  - ⇒ Demobilize all equipment and personnel from the site,
  - ⇒ Submit copies of completed sampling paperwork
  - ⇒ Characterize and dispose of all waste generated from field operations, and
  - ⇒ Document all field activities performed in a close out report.
  - ⇒ Document Chemrad beta/gamma surveys.

2.0 FIELD ACTIVITIES

Prior to mobilization to the field, field preparation activities were conducted. These field preparation activities included a geodetic survey to mark former sample locations, preparation of a Site Specific Health and Safety Plan (SSHASP) by Washington Group International, Inc. (Washington, formerly Morrison Knudsen Corporation), Washington subcontract procurement of Keers Environmental for excavation and hauling activities, Readiness Review preparation and meeting, set up of a radiation screening area in a sampling trailer at the Field Support Facility (FSF) and EM&R coordination.

2.1 Mobilization

Mobilization of equipment and personnel were initiated and completed on August 28, 2000. Washington provided safety equipment and miscellaneous field supplies. Stewart Brothers Drilling Company provided a hollow stem drill rig and all other necessary drilling supplies. ESH -1 mobilized a Radiation Control Technician (RCT) and necessary instruments for radiation surveys and screening of equipment and personnel. Keers mobilized a bobcat skid steer loader, and one support truck. By the end of the day, all safety equipment was ready for use, and work zones were established to begin sampling locations at PRS 2-009(c) with a hollow stem auger drill rig.

2.2 Subsurface Sampling with Hollow Stem Drill Rig

2.2.1 Drill Site Set Up and General Drilling Activities

Plasic sheeting was placed on the ground at each location to be sampled with the hollow stem auger (HSA) drill rig to catch any possible releases due to oil lieaks or spills. During the project, no releases of any kind occurred. The drill rig was driven onto the plasic sheeting, leveled and rigged up to start drilling. Samples were obtained by collecting continuous core with a wireline core system within 4.25 inch inside diameter (ID) hollow stem auger flites.

Work zones were established using postings and caution tape hung on stanchions arround the drill site. When possible, a work zone large enough to encompass multiple sample locations was erected to facilitate greater productivity.

Sampling was performed per LANL ER SOP 6.26, Rev. 0, Core Barrel Sampling for Subsurface Earth Materials. Core runs were all planned to be 2.5 ft in length. The only deviations to this were:

- Short runs because of cobble zones,
- Zones not sampled because a center bit was used in place of the core barrel to drill past cobbles, and

- Short runs purposely drilled to even out the footages following use of the center bit.

Once brought to the surface, each core sample was screened for radioactivity using an Eberline ESP-1 meter equiped with an HP-260 beta gamma probe. Screening results were recorded on the borehole log in disintegrations per minute (dpm). Borehole logs are included in Appendix A. Photographs were taken of the core, with pertinant information included in the photograph on a white board. All photographs from this work are included in Appendix B.

Except for samples collected from PRS 2-009(c) which were screened at the Field Support Facility (FSF), all samples were containerized immediately following field screening of the core for contamination at pre-planned depths. Time critical samples (e.g. analysis for VOCs) were collected first, and the remaining samples were subsequently containerized.

2.2.2 PRS 2-009(c) Sampling

The sampling of PRS 2-009(c) began August 29, 2000 at 0900. Sampling proceeded from East to West in an effort to sample from the least potential contamination to what was assumed to be areas of greater contamination. Samples were planned to be collected at 3 ft intervals for Sr-90 screening in the sample trailer at the FSF. A composit of each 2.5 ft core run was collected and placed in a zip-lock type bag and transferred to the screening trailer at the FSF for Sr-90 screening. Based on the results of the Sr-90 screening, a subset of those samples were to be selected for fixed lab analysis. Since core runs were 2.5 ft in length the sample interval was changed in the field to 2.5 ft. Semivolatile organic compounds (SVOC) analysis was added to the sample suite. This required that a container be filled in the field for SVOCs that could be held pending screening for Sr-90.

Beta/gamma screening in the field and Sr-90 screening at the FSF sample trailer showed no clear hot spots or plumes to bound. Based on this and the holding time constraints for the SVOC samples, it was decided by LANL ER to submit all samples from PRS 2-009(c) and discontinue the Sr-90 screening. Table 1 lists the samples collected at PRS 2-009(c).

Drilling and sampling at PRS 2-009(c) was completed on September 5, 2000. A total of 12 boreholes were drilled to the tuff bedrock and sampled every 2.5 ft. Because of very moist zones encountered at the sediment/tuff interface, all boreholes were backfilled with 3/8 in bentonite chips. Drill cuttings were bagged in drum liners and transferred to a roll off bin at the site for later disposal.

Table 1
Samples collected at PRS 2-009(c)

PRS	Location ID	Planned / Actual Depth (ft)	Sample ID	Target Analyte List Metals	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Tritium	Strontium 90	Total Uranium by ICPMS	Semivolatile Organic Compounds
2-009(c)	02-01225	0-6"/0-3	CA02-00-0019	X	X	X	X	X	X	X	X
		3-3.5/5.0-7.0	CA02-00-0021	X	X	X	X	X	X	X	X
		6-6.5/8.0-9.0	CA02-00-0022	X	X	X	X	X	X	X	X
		9-9.5/10-11.5	CA02-00-0023	X	X	X	X	X	X	X	X
		12-12.5/12.5-15	CA02-00-0024	X	X	X	X	X	X	X	X
	02-01226	0-6"/0-2	CA02-00-0025	X	X	X	X	X	X	X	X
		6-6.5/5-6.5	CA02-00-0026?	X	X	X	X	X	X	X	X
		12-12.5/10-12	CA02-00-0027	X	X	X	X	X	X	X	X
		15-15.5/12.5-14.0	CA02-00-0028	X	X	X	X	X	X	X	X
	02-01227	0-0.5/0-1.0	CA02-00-0029	X	X	X	X	X	X	X	X
		3-3.5/2.5-4.0	CA02-00-0030	X	X	X	X	X	X	X	X
		6-6.5/5-7.5	CA02-00-0031	X	X	X	X	X	X	X	X
		9-9.5/7.5-9	CA02-00-0032	X	X	X	X	X	X	X	X
		12-12.5/10-12	CA02-00-0033	X	X	X	X	X	X	X	X
		15-15.5/12.5-14	CA02-00-0034	X	X	X	X	X	X		X
	02-01228	0-6"	CA02-00-0216	X	X	X	X	X	X	X	X
		0-6"/0-2.5	CA02-00-0035	X	X	X	X	X	X	X	X
		3-3.5/2.5-4.5	CA02-00-0036	X	X	X	X	X	X	X	X
		6-6.5/5.5-7.5	CA02-00-0037	X	X	X	X	X	X	X	X
		9-9.5/7.5-10	CA02-00-0038	X	X	X	X	X	X	X	X
		12-12.5/10-12.3	CA02-00-0039	X	X	X	X	X	X	X	X
		15-15.5/14-12.3	CA02-00-0040	X	X	X	X	X	X	X	X
	02-01229	0-0.5/0-2.5	CA02-00-0041	X	X	X	X	X	X	X	X
		3-3.5/2.5-5	CA02-00-0042	X	X	X	X	X	X	X	X
2-009(c)	02-01229	6-6.5/5.0-7.5	CA02-00-0043	X	X	X	X	X	X	X	X
		9-9.5/7.5-8.3	CA02-00-0044	X	X	X	X	X	X	X	X
		12-12.5/10.5-12	CA02-00-0045	X	X	X	X	X	X	X	X
		15-15.5/12.5-15	CA02-00-0046	X	X	X	X	X	X	X	X
	02-01230	0-0.5/0-2.0	CA02-00-0047	X	X	X	X	X	X	X	X
		3-3.5/2.5-4.0	CA02-00-0048	X	X	X	X	X	X	X	X
		6-6.5/5.0-7.0	CA02-00-0049	X	X	X	X	X	X	X	X
		9-9.5/8.0-10	CA02-00-0050	X	X	X	X	X	X	X	X
		12-12.5/10-11.5	CA02-00-0051	X	X	X	X	X	X	X	X
		15-15.5/12.5-14	CA02-00-0052	X	X	X	X	X	X	X	X
		18-18.5/15-17.5	CA02-00-0053	X	X	X	X	X	X	X	X
	02-01231	0-0.5/0-2.5	CA02-00-0054	X	X	X	X	X	X	X	X
		3-3.5/2.5-5	CA02-00-0055	X	X	X	X	X	X	X	X
		6-6.5/5-6.5	CA02-00-0056	X	X	X	X	X	X	X	X

Table 1 (continued)
Samples collected at PRS 2-009(c)

PRS	Location ID	Planned / Actual Depth (ft)	Sample ID	Target Analyte List Metals	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Tritium	Strontium 90	Total Uranium by ICPMS	Semivolatile Organic Compounds
		9-9.5/7.5-10	CA02-00-0057	X	X	X	X	X	X	X	X
		12-12.5/10-12.0	CA02-00-0058	X	X	X	X	X	X	X	X
		15-15.5/12.5-13	CA02-00-0059	X	X	X	X	X	X	X	X
		18-18.5/13-15.0	CA02-00-0060	X	X	X	X	X	X	X	X
	02-01232	0-0.5/0-2.5	CA02-00-0061	X	X	X	X	X	X	X	X
		3-3.5/2.5-4.9	CA02-00-0062	X	X	X	X	X	X	X	X
		6-6.5/5-7.0	CA02-00-0063	X	X	X	X	X	X	X	X
		9-9.5/7.5-10	CA02-00-0064	X	X	X	X	X	X	X	X
		12-12.5/10-11	CA02-00-0065	X	X	X	X	X	X	X	X
		15-15.5/12.5-15	CA02-00-0066	X	X	X	X	X	X	X	X
	02-01233	0-0.5/0-2.3	CA02-00-0075	X	X	X	X	X	X	X	X
		3-3.5/2.5-5	CA02-00-0076	X	X	X	X	X	X	X	X
		6-6.5/5-7.5	CA02-00-0077	X	X	X	X	X	X	X	X
		9-9.5/7.5-10	CA02-00-0070	X	X	X	X	X	X	X	X
		12-12.5/11-12.5	CA02-00-0071	X	X	X	X	X	X	X	X
		15-15.5/12.5-13.5	CA02-00-0072	X	X	X	X	X	X	X	X
		18-18.5/14-15	CA02-00-0073	X	X	X	X	X	X	X	X
		21-21.5/15-17.5	CA02-00-0074	X	X	X	X	X	X	X	X
	02-01234	0-0.5/0-2.0	CA02-00-0078	X	X	X	X	X	X	X	X
		3-3.5/2.5-5	CA02-00-0079	X	X	X	X	X	X	X	X
		6-6.5/5.0-7.0	CA02-00-0080	X	X	X	X	X	X	X	X
		9-9.5/7.5-9.25	CA02-00-0081	X	X	X	X	X	X	X	X
		12-12.5/10-11.5	CA02-00-0082	X	X	X	X	X	X	X	X
	02-01235	0-0.5/0-2.5	CA02-00-0083	X	X	X	X	X	X	X	X
		3-3.5/2.5-4.5	CA02-00-0084	X	X	X	X	X	X	X	X
		6-6.5/5-5.5	CA02-00-0085	X	X	X	X	X	X	X	X
		9-9.5/6-7.5	CA02-00-0086	X	X	X	X	X	X	X	X
		12-12.5/8.5-9.5	CA02-00-0087	X	X	X	X	X	X	X	X
		15-15.5/10-12	CA02-00-0088	X	X	X	X	X	X	X	X
		18-18.5/12.5-13.7	CA02-00-0089	X	X	X	X	X	X	X	X
		21-21.5/15-17	CA02-00-0090	X	X	X	X	X	X	X	X
	02-01236	0-0.5/0-2.5	CA02-00-0091	X	X	X	X	X	X	X	X
		3-3.5/2.5-4	CA02-00-0092	X	X	X	X	X	X	X	X
		6-6.5/5-7.5	CA02-00-0093	X	X	X	X	X	X	X	X
		9-9.5/7.5-8	CA02-00-0094	X	X	X	X	X	X	X	X
		12-12.5/8.5-10	CA02-00-0095	X	X	X	X	X	X	X	X
		15-15.5/10-10.5	CA02-00-0096	X	X	X	X	X	X	X	X
		18-18.5/11.5-12	CA02-00-0097	X	X	X	X	X	X	X	X
		21-21.5/12.5-15	CA02-00-0098	X	X	X	X	X	X	X	X

2.2.3 Sampling at PRS 2-003(c)

Two boreholes were drilled and sampled at PRS 2-003(c) on September 6, 2000. The borehole at location 02-01237 was started at 0830 hours and completed by 0930. The borehole at location 02-01238 was started at 1050 hours and completed 1230 hours. Field screening did not indicate the presence of contamination in either borehole, so samples were collected at the pre-planned intervals. Table 2 lists the samples collected, the planned and actual depths, and analysis. No water was encountered in either of the boreholes drilled at this PRS and the cuttings were returned to the boreholes.

Table 2
Samples Collected at PRS 2-003(c)

PRS	Location ID	Planned / Actual Depth (ft)	Sample ID	Target Analyte List Metals	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Tritium	Strontium 90	Total Uranium by ICPMS
2-003(c)	02-01237	0-0.5 / 0-1.0	CA02-00-0123	X	X	X	X	X	X	X
		3-3.5 / 3.0-3.5	CA02-00-0124	X	X	X	X	X	X	X
		5 ft Backfill-tuff interface/8.0-8.75	CA02-00-0125	X	X	X	X	X	X	X
	02-01238	0-0.5 / 0-1.0	CA02-00-0126	X	X	X	X	X	X	X
		3-3.5 / 4.0-4.0	CA02-00-0127	X	X	X	X	X	X	X
		5 ft Backfill-tuff interface/14-14.75	CA02-00-0128	X	X	X	X	X	X	X

2.2.4 Sampling at PRS 2-011(b)

A single borehole was drilled and sampled at PRS 2-011(b). Drilling and sampling began on september 6, 2000. Repairs to the wireline were necessary after the 7.5 to 10.0 ft core run. Repairs were completed by the end of the day, and the final five ft of drilling was not completed until September 7, 2000 at 0945 hours. Five samples were collected at location 02-01239. The borehole was drilled to a total depth of 15 ft. Moisture at the sediment/tuff interface prompted backfilling the borehole with 3/8 inch bentonite chips. Cuttings from the borehole were placed in drum liners and transferred to a roll off bin on site for disposal.

Field screening did not indicate any elevated radiation levels in the recovered core, allowing samples to be collected at the preplanned depth intervals. Table 3 lists the samples collected, planned and actual depths, and analysis to be performed.

Table 3
Samples collected at PRS 2-011(b)

PRS	Location ID	Planned / Actual Depth (ft)	Sample ID	Target Analyte List Metals	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Tritium	Strontium 90	Total Uranium by ICPMS
02-011(b)	02-01239	0-0.5/0-1	CA02-00-0308	X	X	X	X	X	X	X
		3-3.5/3.0-4.0	CA02-00-0309	X	X	X	X	X	X	X
		6-6.5/6.0-7.0	CA02-00-0310	X	X	X	X	X	X	X
		12-12.5/11.5-13	CA02-00-0311	X	X	X	X	X	X	X
		15-15.5/14-15	CA02-00-0312	X	X	X	X	X	X	X

2.2.5 Sampling at PRS 2-003(a,e)

Drilling and sampling at PRS 2-003(a,e) began on September 7, 2000 at 1130 hours. The corners of the former building location were staked during the premobilization geodetic survey using historical facility drawings. Location 02-01240 was located just east of the former buildings east wall. Location 02-01241 was planned for the center of the former building. Location 02-01242 was planned to be located west of the former building location, east of former sample location 02-01026.

Location 02-01240 was drilled to a total depth of 22.5 ft. Samples were collected as planned from 0.0 to 7.5 ft. Elevated radiation levels (1000 dpm) were encountered in the 5.0 to 7.5 ft core run where a sample was collected as planned. Radiation levels as high as 4000 dpm were identified in the 7.5 to 10.0 ft core run. This appears to correspond with the uppermost fill material/sediment contact. A sample was collected from the interval with the highest radiation screening levels (8.5 to 10.0 ft). ESH-1 was contacted as were LANL ER Project staff.

ESH-1 gave permission to proceed with work with no changes as long as the radiation screening levels did not increase. Wet sediments were encountered in the 17.5 to 20.0 ft core run and were sampled. A sample of moist tuff was sampled at 21.5 to 22.5 below the saturation at the sediment tuff contact. Moisture in the bottom of the hole and the presence of elevated radiation levels prompted backfilling of the hole with 3/8 inch bentonite chips and transferring the drill cuttings to the roll off bin on site for waste disposal.

Drilling at location 02-01241 began at approximately 1600 hours on September 7, 2000, and was completed the following day by 0900 hours. Significantly elevated radiation levels were not encountered during field screening, and the borehole was sampled as planned. The borehole was backfilled with 3/8 in. bentonite chips and the cuttings transferred to the onsite roll off bin for disposal.

Drilling of location 02-01242 began at 0930 hours on September 8, 2000 and was completed on the same day at 1030 hours. No elevated radiation levels were detected by radiation screening in the field, and the borehole was sampled as planned. The borehole was backfilled with 3/8 inch bentonite chips and the cuttings transferred to the onsite roll off bin for disposal. Table 4 summarizes sample information.

Based on the elevated field screening results observed at location 02-01240, step out holes were planned for this PRS. Before these holes could be drilled, the rig had to be demobilized from the site for other work. Attempts were made to collect samples at depth using an electric powered hand auger without success. Because of the cobbles within the fill material, the electric powered hand auger was unable to penetrate to depths greater than 3.0 ft before reaching refusal or twisting off the auger flight. Therefore, no step out samples were collected.

2.2.6 Sampling at PRS 02-009(b)

Drilling and sampling of PRS 02-009(b) began at location 02-01243 located near former sample location 02-01126. No elevated radiation levels were encountered during the drilling of the borehole and samples were collected as planned. The total depth of the borehole was 14 ft where the rig met with refusal in a cobble zone. Therefore, the sample planned for 15.0 to 15.5 ft was collected from the 13.0 to 14.0 ft depth interval as instructed by the LANL ER Project. The borehole was backfilled with bentonite chips and the cuttings were transferred to the on site roll-off bin for disposal.

The second and final borehole drilled and sampled at PRS 02-009(b) was at location 02-01244 associated with former sample location 02-01123. Drilling began at 1320 hours and completed the same day. Samples were collected as planned, with the absence of elevated radiation screening. A cobble

zone resulted in auger refusal at a depth of 13.5 ft. The borehole was backfilled with bentonite chips and the cuttings transferred to the on site roll off bin for disposal. Sample information is summarized in Table 5.

Table 4
Samples collected at PRS 2-003(a, e)

PRS	Location ID	Planned / Actual Depth (ft)	Sample ID	Target Analyte List Metals	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Tritium	Strontium 90	Total Uranium by ICPMS
2-003(a,e)	02-01240	0-0.5 / 0-0.6	CA02-00-0131	X	X	X	X	X	X	X
		3-3.5 / 3.0-4.0	CA02-00-0132	X	X	X	X	X	X	X
		6-6.5 / 6.0-7.0	CA02-00-0133	X	X	X	X	X	X	X
		NA/8.5-10	CA02-00-0134	X	X	X	X	X	X	X
		12-12.5/11.5-12.5	CA02-00-0135	X	X	X	X	X	X	X
		15-15.5/15-16	CA02-00-0136	X	X	X	X	X	X	X
		NA / 18.5-19.5	CA02-00-0137	X	X	X	X	X	X	X
		NA /21.5 - 22.5	CA02-00-0138	X	X	X	X	X	X	X
	02-01241	0-0.5 / 0-1.0	CA02-00-0139	X	X	X	X	X	X	X
		3-3.5 / 3.0-4.0	CA02-00-0140	X	X	X	X	X	X	X
		6-6.5 / 7.5-8.5	CA02-00-0141	X	X	X	X	X	X	X
		12-12.5/11.5-12.5	CA02-00-0142	X	X	X	X	X	X	X
		15-15.5/15-16.5	CA02-00-0143	X	X	X	X	X	X	X
	02-01242	0-0.5 / 0-1.0	CA02-00-0144	X	X	X	X	X	X	X
		3-3.5 / 2.5 - 4.0	CA02-00-0145	X	X	X	X	X	X	X
		3-3.5 / 2.5 - 4.0 (Duplicate Sample)	CA02-00-0153	X	X	X	X	X	X	X
		6-6.5 / 6.0 - 7.0	CA02-00-0146	X	X	X	X	X	X	X
		12-12.5/10.5-14.5	CA02-00-0147	X	X	X	X	X	X	X
		15-15.5 / 15-16	CA02-00-0148	X	X	X	X	X	X	X

Table 5
Samples collected at PRS 2-009(b)

PRS	Location ID	Planned / Actual (ft)	Sample ID	Target Analyte List Metals	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Tritium	Strontium 90	Total Uranium by ICPMS
02-009(b)	02-01244	0-0.5 / 0-1.0	CA02-00-0179	X	X	X	X	X	X	X
		3-3.5 / 3-4.0	CA02-00-0180	X	X	X	X	X	X	X
		6-6.5 / 6-7.0	CA02-00-0181	X	X	X	X	X	X	X
		12-12.5 / 12.5-13.5	CA02-00-0182	X	X	X	X	X	X	X
	02-01243	0-0.5 / 0-1.0	CA02-00-0174	X	X	X	X	X	X	X
		3-3.5 / 3-4.0	CA02-00-0175	X	X	X	X	X	X	X
		6-6.5 / 5.0-7.0	CA02-00-0176	X	X	X	X	X	X	X
		12-12.5/11.5-12.5	CA02-00-0177	X	X	X	X	X	X	X
		15-15.5 / 13-14	CA02-00-0178	X	X	X	X	X	X	X

2.2.7 Sampling at PRS 2-009(d)

Only one of the two boreholes planned for PRS 2-009 (d) was drilled because of poor access conditions for the drill rig. Location 02-01245 was drilled just north of building TA-2-63 on September 11, 2000. Drilling and sampling proceeded to a total depth of 15.0 ft as planned. No elevated radiation screening was encountered. The borehole was backfilled with bentonite chips and the cuttings placed in the on site roll off bin for disposal. Sample information is summarized in Table 6.

Table 6
Samples collected at PRS 2-009(d)

PRS	Location ID	Planned / Actual (ft)	Sample ID	Target Analyte List Metals	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Tritium	Strontium 90	Total Uranium by ICPMS	Semivolatile Organic Compounds
2-009(d)	02-01245	3-3.5 / 4-5.0	CA02-00-0290	X	X	X	X	X	X	X	X
		6-6.5 / 5-8.0	CA02-00-0291	X	X	X	X	X	X	X	X
		12-12.5/10-11.5	CA02-00-0292	X	X	X	X	X	X	X	X
		15-15.5/14.5-15	CA02-00-0293	X	X	X	X	X	X	X	X

2.2.8 Sampling at PRS 2-010

Two boreholes were planned to be drilled at PRS 2-010. One, the borehole planned to be drilled between buildings TA-2-63 and TA-2-1 was cancelled since the burried pipe that was the target could not be located. The remaining borehole at location 02-01246 was started and completed on September 11, 2000.The borehole is located just east of and centered on the east wall of building TA-2-63. This borehole was drilled at a 45 degree angle and targeted the sediment/tuff contact beneath the building. The borehole is a total of 39 linear ft deep. There were no elevated radiation screening results in the revovered cores. The borehole was sampled as planned, with an additional sample collected at 17.5 linear ft when drilling conditions became difficult and it appeared that the hole may be lost because of the difficulty encountered inangle drilling through cobble zones. The borehole was backfilled with bentonite chips on September 13, 2000 in the same manner as the previous boreholes. Drill cuttings were transferred to the on site roll off bin for disposal. Sample information is summarized in Table 7.

Table 7
Samples Collected at PRS 2-010

PRS	Location ID	Planned / Actual (ft)	CA02-00-0	Target Analyte Metals	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Tritium	Strontium 90	Total Uranium by ICPMS	Perchlorate	Semivolatile Organic Compounds
02-010	02-01246	0-0.5 / 0-1.0	CA02-00-0300	X	X	X	X	X	X	X	X	X
		5-5.5 / 7.5-9	CA02-00-0301	X	X	X	X	X	X	X	X	X
		17.5-18.8	CA02-00-0302									
		Immediately below backfill-tuff interface (0.5 ft interval)/34.5-36.5	CA02-00-0303	X	X	X	X	X	X	X	X	X
		1 ft below backfill-tuff interface (0.5 ft interval)/37.5-39	CA02-00-0304	X	X	X	X	X	X	X	X	X

2.3 Drill Rig Decontamination and Demobilization

Sampling equipment was decontaminated at the site using Alconox and deionized water. Less than 6 gallons of decontamination liquids were generated and discharged to the PRS each day in accordance

with the approved guidance from ESH-18. The drilling equipment was dry decontaminated on site and later free released by ESH-1.

3.0 SURFACE AND SHALLOW SUBSURFACE SAMPLE COLLECTION

All samples collected after the drilling of location 2-01246 were collected by hand using either a hand auger of electric powered hand auger. Samples were collected per LANL-ER-SOP-6.10, Rev. 1, Hand Auger and Thin-wall Tube Sampler.

3.1 Sample collection at PRS 2-011(c,d)

Sample collection at PRS 2-011(c,d) began on September 13, 2000. Location 2-01247 was planned to be sampled from 0.0 to 0.5 ft and again at 3.0 to 3.5 ft. The 0.0 to 0.5 ft sample and a duplicate sample (CA02-00-0319 and CA02-00-0326, respectively) were collected using a hand auger. Repeated attempts were made to collect the deeper sample but refusal was encountered at 1.0 ft.

A single sample (CA02-00-0324) from 0.0 to 0.5 ft was collected east of outfall TA-2-44 at location 2-01248. The deeper sample planned for the 3.0 to 3.5 ft interval could not be collected because of hand auger refusal at 1.0 ft depth. Sample information is summarized in table 8.

Table 8
Samples Collected at PRS 2-011(c,d)

PRS	Location ID	Planned / Actual (ft)	Sample ID	Target Analyte List Metals	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Tritium	Strontium 90	Total Uranium by ICPMS
02-011 (c,d)	02-01247	0-0.5 / 0-0.5	CA02-00-0326	X	X	X	X	X	X	X
			CA02-00-0319	X	X	X	X	X	X	X
	02-01248	0-0.5 / 0-0.5	CA02-00-0324	X	X	X	X	X	X	X

3.2 Sample collection at PRS 2-011(e)

Sample collection at PRS 2-011(e) was performed on September 13, 2000. Location 2-01249 was planned to be sampled from 0.0 to 0.5 ft and again at 3.0 to 3.5 ft. The 0.0 to 0.5 ft sample (CA02-00-0321) was collected from below outfall TA-2-49 using a hand auger. Repeated attempts were made to collect the deeper sample but refusal was encountered at 1.0 ft. Sample information is summarized in table 9.

Table 9
Samples Collected at PRS 2-011 (e)

PRS	Location ID	Planned / Actual Depth (ft)	Sample ID	Target Analyte List Metals	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Tritium	Strontium 90	Total Uranium by ISPMS
02-011(e)	02-01249	0-0.5 / 0-0.5	321	X	X	X	X	X	X	X

3.3 Sample collection at PRS 2-006(e)

Sample collection at PRS 2-006(e) was performed on September 14, 2000. Location 2-01095 was planned to be sampled from 0.0 to 0.5 ft, 2.0 to 2.5 ft and again at 4.0 to 4.5 ft. The 0.0 to 0.5 ft sample (CA02-00-0155) was collected from 0.0 to 0.5 ft as planned using a hand auger. A sample (CA02-00-0156) was collected from 1.9 to 2.2 ft at auger refusal in place of the 2.0 to 2.5 ft sample planned. The 4.0 to 4.5 ft sample could not be collected due to hand auger refusal in cobbles.

Location 02-01250 (2 ft east of 02-01095) was planned for the same intervals as location 02-01095. Sampling of this location was attempted on September 15, 2000 using an electric powered hand auger to attempt to reach depths greater than the 1 to 2 ft achieved with the normal hand auger. The 0.0 to 0.5 ft sample was collected as planned. Attempts were made at seven different locations adjacent to location 02-01250 to collect a sample from the 2.0 to 2.5 ft depth interval without success. After twisting off an auger flight at the seventh location, no further attempts were made. Sample information is summarized in table 10.

Table 10
Samples Collected at PRS 2-006(e)

PRS	Location ID	Planned / Actual (ft)	Sample ID	Target Analyte List Metals	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Tritium	Strontium 90	Total Uranium by ISPMS	Perchlorate	Semivolatile Organic Compounds
02-006(e)	02-01095	0-.5 / 0-0.5	CA02-00-0155	X	X	X	X	X	X	X	X	X
		2-2.5 / 1.9 - 2.2	CA02-00-0156	X	X	X	X	X	X	X	X	X
	02-01250	0-.5 / 0-0.5	CA02-00-0162	X	X	X	X	X	X	X	X	X

3.4 Sample collection at PRS 2-006(b)

Sampling of PRS 02-006(b) took place on September 15, 2000. Samples were planned for 0 to 0.5 ft, 2.0 to 2.5 ft and 4.5 to 5.0 ft. The 0.0 to 0.5 ft sample was collected from location 02-01094 using a hand auger. Attempts were made to auger deeper for the remaining samples, but flow in the stream channel began to enter the sample location and no other samples were collected. Flow was the result of draining of the Los Alamos reservoir, not an ongoing precipitation event. Sample information is summarized in table 11.

Table 11
Samples Collected at PRS 2-006(b)

PRS	Location ID	Planned / Actual Depth (ft)	Sample ID	Target Analyte List Metals	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Tritium	Strontium 90	Total Uranium by ISPMS	Perchlorate	Semivolatile Organic Compounds	Volatile Organic Compounds	Polychlorinated Biphenols
02-006(b)	02-01251	0-.5 / 0-0.5	161	X	X	X	X	X	X	X	X	X	X	X
	02-01094	0-.5 / 0-0.5	157	X	X	X	X	X	X	X	X	X	X	X

3.5 Sample collection at PRS 2-011(a)

Sampling of PRS 2-011(a) began on September 14, 2000. Locations 02-01150, 02-01152, and 02-01153 were planned to be sampled from 0.0 to 0.5 ft, and 2.5 to 3.0 ft depth intervals. A sample and duplicate sample were collected from location 02-01150 (CA02-00-0320 and CA02-00-0322 respectively) as planned. Sample CA02-00-0323 was collected from 2.3 to 2.7 ft at the same location. Location 02-01152 was sampled from the 0.0 to 0.5 ft depth interval as planned (CA02-00-0192). The 2.5 to 3.0 ft sample planned for this location could not be sampled due to auger refusal at 0.8 ft depth. Location 02-01153 was sampled from 0.0 to 0.5 ft with a hand auger (CA02-00-0193). A sample (CA02-00-0198) was also collected at this location from the 2.2 to 2.5 ft depth interval in place of the 2.5 to 3.0 ft sample planned because of auger refusal at 2.5 ft. Sample information is presented in table 12.

Table 12
Samples Collected at PRS 2-011(a)

PRS	Location ID	Planned / Actual Depth (ft)	Sample ID	Target Analyte List Metals	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Tritium	Strontium 90	Total Uranium by ICPMS
02-011(a)	02-01150	0-0.5 / 0-0.5	CA02-00-0322	X	X	X	X	X	X	X
		0-0.5 / 0-0.5	CA02-00-0322	X	X	X	X	X	X	X
		2.5-3 / 2.3-2.7	CA02-00-0323	X	X	X	X	X	X	X
	02-01152	0-0.5 / 0-0.5	CA02-00-0192	X	X	X	X	X	X	X
	02-01153	0-0.5 / 0-0.5	CA02-00-0193	X	X	X	X	X	X	X
		2.5-3 / 2.2-2.5	CA02-00-0198	X	X	X	X	X	X	X

3.6 Sample collection at PRS 2-003(d)

Sampling of PRS 2-003(d) began on September 15, 2000. Three locations (Location 02-01254, 02-01255 and 02-01256) were to be sampled at three depths (0 to 0.5 ft, 3.0 to 3.5 ft and 5.0 to 5.5 ft). Location 02-01254 was located 2 ft east of old sample location 02-01030. Sample CA02-00-0281 was sampled from 0.0 ft to 0.5 ft as planned. Sample CA02-00-0282 was sampled from 2.0 ft to 2.5 ft rather than 3.0 ft to 3.5 ft as planned due to auger refusal. No deeper samples were collected at this location.

Location 02-01255 was originally sampled 20 south of location02-01031. Boulders of tuff were encountered at 0.5 ft below the surface. Samples were collected 50 ft to 55 ft south of 02-01031 so that a second sample could be collected. At this location, the 0.0 ft to 0.5 ft sample (CA02-00-0283) was collected as planned and a sample (CA02-00-0284) from 2.2 ft to 2.5 ft was collected rather than 3.0 ft to 3.5 ft as planned. The deviation was a result of auger refusal at 2.5 ft and no deeper samples were collected at this location.

Location 02-01256 (25 ft northwest of 02-01032) was sampled on September 18, 2000. The 0.0 to 0.5 ft sample (CA02-00-0285) was sampled as planned. A second sample and a duplicate sample (CA02-00-0286 and CA02-00-0287) was collected at this location from 2.0 to 2.75 ft depth interval rather than the 3.0 to 3.5 ft depth planned. The change was due to auger refusal in tuff boulders. No deeper samples were collected. Sample information is presented in table 13.

Table 13
Samples Collected at PRS 2-003(d)

PRS	Location ID	Planned / Actual Depth (ft)	Sample ID	Target Analyte List Metals	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Tritium	Strontium 90	Total Uranium by ICPMS
2-003(d)	02-01256	0-0.5 / 0-0.5	CA02-00-0285	X	X	X	X	X	X	X
		3-3.5 /2-2.75	CA02-00-0286	X	X	X	X	X	X	X
		3-3.5 /2-2.75	CA02-00-0287	X	X	X	X	X	X	X
	02-01254	0-0.5 / 0-0.5	CA02-00-0281	X	X	X	X	X	X	X
		3-3.5 / 2.0-2.5	CA02-00-0282	X	X	X	X	X	X	X
	02-01255	0-0.5 / 0-0.5	CA02-00-0283	X	X	X	X	X	X	X
		3-3.5 / 2.2-2.5	CA02-00-0284	X	X	X	X	X	X	X

3.7 Sample collection at PRS 2-012

Samples planned for PRS 2-012 were to characterized potential releases from structure TA-2-67 and TA-2-29. The location of TA-2-29 could not be determined and no samples planned in association with this structure were collected. Three locations were selected by LANL for samples associated with structure TA-2-67. These locations (02-01256, 02-01257, and 02-01258) were to be sampled at 3.0 ft to 3.5 ft and again at 5.0 ft to 5.5 ft. Location 02-01256 was sampled as planned. Sample CA-02-00-0337 was collected from 3.0 ft to 3.5 ft. Sample CA02-00-0338 and duplicate sample CA02-00-0343 were collected from 5.0 ft to 5.5 ft. Location 02-01257 was sampled as planned. Sample CA-02-00-0339 was collected from 3.0 ft to 3.5 ft. Sample CA02-00-0340 was collected from 5.0 ft to 5.5 ft. Location 02-01258 was sampled as planned. Sample CA-02-00-0341 was collected from 3.0 ft to 3.5 ft. Sample CA02-00-0342 was collected from 5.0 ft to 5.5 ft. No staining or odors were noted in any of the sample materials collected from these locations. Sample information is presented in table 14.

Table 14
Samples Collected at PRS 2-012

PRS	Location ID	Planned / Actual Depth(ft)	Sample ID	Total Uranium by ICPMS	Total Petroleum Hydrocarbons
02-012	02-01258	3-3.5 / 3-3.5	341	X	X
		5-5.5 / 5-5.5	342	X	X
	02-01257	3-3.5 / 3-3.5	339	X	X
		5-5.5 / 5-5.5	340	X	X
	02-01265	3-3.5 / 3-3.5	337	X	X
		5-5.5 / 5-5.5	338	X	X
		5-5.5 / 5-5.5	343	X	X

4.0 SOIL REMOVAL ACTIVITIES

4.1 Preparatory Activities

Preparation for soil removal activities at the metal nugget pile C-02-001 and PRS 2-009(a) began on September 20, 2000 with erosion control best management practices (BMP) installation. Approximately 90 ft of straw wattles were staked out downslope of the planned excavations between the road and the creek. The wattles extended east and west of the areas that might have been disturbed during excavation activities. Photographs of BMP installations are included in Appendix B.

A metal detector survey of the metal nugget pile was performed in order to confirm the area to be excavated. The survey confirmed that the nugget pile was fairly small and well defined. A metal detector survey of the road bed was also performed. The survey identified abundant metal debris (i.e. wire, nails etc.) and a few stray nuggets. There was no indication any other dumping location between the metal nugget pile and the point where the stream crosses the road.

4.2 Metal Nugget Pile

Excavation of the metal nugget pile was performed on September 28, 2000. Two truckloads of soil and metal nuggets were transported to the Los Alamos County Landfill totalling 31280 lbs of material for disposal. Verification samples were collected on October 2, 2000 Samples CA02-00-0121 and CA02-00-0122 were collected from location 02-01262. Samples CA02-00-0119 and CA02-00-0120 were collected from location 02-01261. Both locations were sampled from 0 to 6 in and 2.0 to 2.5 ft depths. A visual inspection and metal detector survey was performed of the excavated area prior to stabilization.

4.3 Radioactive Soil Removal

Earlier radiation surveys conducted by Chem Rad east of TA-2 identified two areas of radioactive soil contamination. One area was north of the creek and coincident with location 02-01228 was posted by ESH-1 because surface soils read 2 times background. The second location was within PRS 02-009(a) and made up of 5 small areas of soil contamination. Two of areas at PRS 02-009(a) were located near the southeast corner of the TA-2 security fence. These locations were associated with pieces of concrete construction debris. Two areas of soil contamination were identified on and adjacent to a large tuff boulder. The fifth area of soil contamination was just south of the tuff boulder.

4.3.1 Location 02-01228

Hand digging of the elevated soil was performed at location 02-01228 North of the creek on September 26, 2000. Soils were placed in a plastic drum liner which was in turn placed in a waste container. The area was surveyed on September 27, 2000 by ESH-1 with a 2x2 NaI detector. A small amount of additional soil was excavated by hand and ESH-1 determined that the postings for soil contamination could be removed from the location.

A confirmatory sample was collected from 0.0 to 6.0 in. on September 30, 2000. Analytical results from drilling at the same location will be used for deeper confirmatory samples. These samples are listed in the Table 1 (location 02-01228) for drilling and sampling of PRS 02-009(c).

4.3.2 PRS 02-009(a)

Removal of contaminated soils at PRS 02-009 a) began on September 26, 2000 at the hot spots near the southeast corner of the TA-2 security fence. Hand digging began at the northernmost hot spot. Digging proceeded until no elevated areas could be identified with an ESP-1 meter equiped with an HP – 260 beta/gamma probe.

Screening in the area of the concrete debris adjacent to the excavation showed that the second hot spot in the area was reading 8500 dpm and that the contamination may extend beneath the debris. No further activities were conducted that day.

On September 27, 2000, ESH-1 surveyed the hot spot excavation near the southeast corner of the TA-2 security fence and identified areas that needed additional soil removal. The additional areas were hand dug. The area was resurveyed and released by ESH-1. A total of 1.25 cubic yards of contaminated soil were removed and placed in a B-12 box for disposal.

The area at the south end of the concrete debris was dug using a backhoe mobilized to the site on September 27, 2000. The backhoe was used to move the concrete debris. The soil beneath the debris was screened and no elevated levels were detected. The debris was also screened and found to be clean. The elevated soils were removed using the backhoe. Digging continued until a total of three B-12 boxes were filled. Three and three-quarters cubic yards of soil were removed from the south end of the concrete debris. In total, 5 cubic yards of soil were removed to allow release of the two locations.

Excavation of the hot spots surounding the large boulders at PRS 02-009(a) was started on September 27, 2000. Surveys with a 2x2 NaI detector showed over 1 million counts per minute at the hottest location on the east side of the boulders. Two B-12 boxes were filled using the backhoe. Surveys of the excavation area were hampered by radiation "shine" from contamination on the boulder.

Attempts were made to remove contamination from the tuff boulder by scraping with the backhoe bucket. Dispite spraying with water while scraping, dust was generated and it was decided the next day that scraping of the boulder would require respiratory protection. At the end of the day, three B-12 boxes of contaminated soil were generated from digging activities adjacent to the boulders. The following day was spent modifying the Radiation Work Permit to include respiratory protection.

Work resumed on September 29, 2000 when an electric powered jackhammer was used to remove the contaminated face of the tuff boulder. After two hours of work, the boulder was still contaminated. Additional screening showed that the soil between the boulders was reading 100,000 counts per minute. At that time, the determination was made that the contaminated boulder needed to be removed from the excavation area in order to remove additional contaminated soil. The boulder was scraped with onsite heavy equipment which removed the remaining contamination. It was then moved adjacent to the SE corner of the TA-2 security fence near the concrete debris. Screening by ESH-1 indicated that no contamination remained on the boulder that would require it to be controled for radioactive contamination.

Soil removal activities continued on October 2 and 3, 2000, with removal activities in the area of the boulder. By the end of October 3, 2000 a total of 17 B-12 boxes of contaminated soil were removed from PRS 2-009(a). Two roll off bins were delivered to the site on October 4, 2000 and filled that day. Minor digging of soil in the area of the boulder was done by hand based on screening with a 2x2 NaI detector. This soil was placed in drum liners and transferred to the roll off bin at the site. Table 15 summarizes the excavation activities at PRS 02-009(a). The total volume of soil removed during the project was 58.33 cubic yards. Twenty-eight and a third cubic yards of soil was contained in B-12 boxes and 30 cubic yards was stored in two roll off bins.

After filling the two roll-off bins, discussions with ER Project personnel indicated that this phase of soil removal should conclude. A walkover survey of the PRS 02-009(a) area was performed using the 2x2 NaI instrument and also by ChemRad using a 1x1 NaI instrument. ChemRad survey maps 4.3.2-1 through 4.3.2-4 show the site conditions before soil removal through site restoration. A significant reduction in CPMs can be seen as a result of the soil removal. Verification samples were collected from the east side of the boulders and south of the boulders (locations 02-01263 and 02-01264 respectively) at three depths intervals. Table 16 lists the sample information for PRS 02-009(a).

PRGs for Cs-137 were developed using RESRAD and inputs appropriate for a laboratory worker scenario (Appendix C). Results of the calculations generated a PRG of 44 pCi/g for Cs-137.

Table 15
Summary of soil excavation activities at PRS 02-009(a).

DATE	LOCATION	VOLUME REMOVED	TOTAL VOLUME REMOVED
September 27,.2000	North end of debris	1.25 cubic yards	1.25 cubic yards
September 27, 2000	South end of debris	3.75 cubic yards	5.0 cubic yards
September 27, 2000	Boulder Area	5.0 cubic yards	10.0 cubic yards
October 2, 2000	Boulder Area	10.0 cubic yards	20.0 cubic yards
October 3, 2000	Boulder Area	8.33 cubic yards	28.33 cubic yards
October 4, 2000	Boulder Area	30 cubic yards	58.33 cubic yards

Table 16
PRS 02-009(a) confirmatory samples

PRS	Location ID	Planned / Actual (ft)	Sample ID	Target Analyte List Metals	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Tritium	Strontium 90	Total Uranium by ICPMS
02-009(a)	02-01259	0-6"/0-6"	CA02-00-0186	X	X	X	X	X	X	X
		3-3.5/2-2.5'	CA02-00-0187	X	X	X	X	X	X	X
	02-01260	0-6"/0-6"	CA02-00-0188	X	X	X	X	X	X	X
		3-3.5/2-2.5'	CA02-00-0189	X	X	X	X	X	X	X
	02-01263	0-6"	CA02-00-0208	X	X	X	X	X	X	X
		2-2.5'2	CA02-00-0209	X	X	X	X	X	X	X
		5-5.5	CA02-00-0211	X	X	X	X	X	X	X
		5-5.5	CA02-00-0212	X	X	X	X	X	X	X
	02-01264	0-6"	CA02-00-0213	X	X	X	X	X	X	X
		2-2.5'	CA02-00-0214	X	X	X	X	X	X	X
		5-5.5	CA02-00-0215	X	X	X	X	X	X	X

FIGURE 4.3.2-1 PRS 02-009(A) SITE AND SURROUNDING AREA PRIOR TO SOIL EXCAVATION ACTIVITIES.

LOGGER Analyze v1.54m Track Map

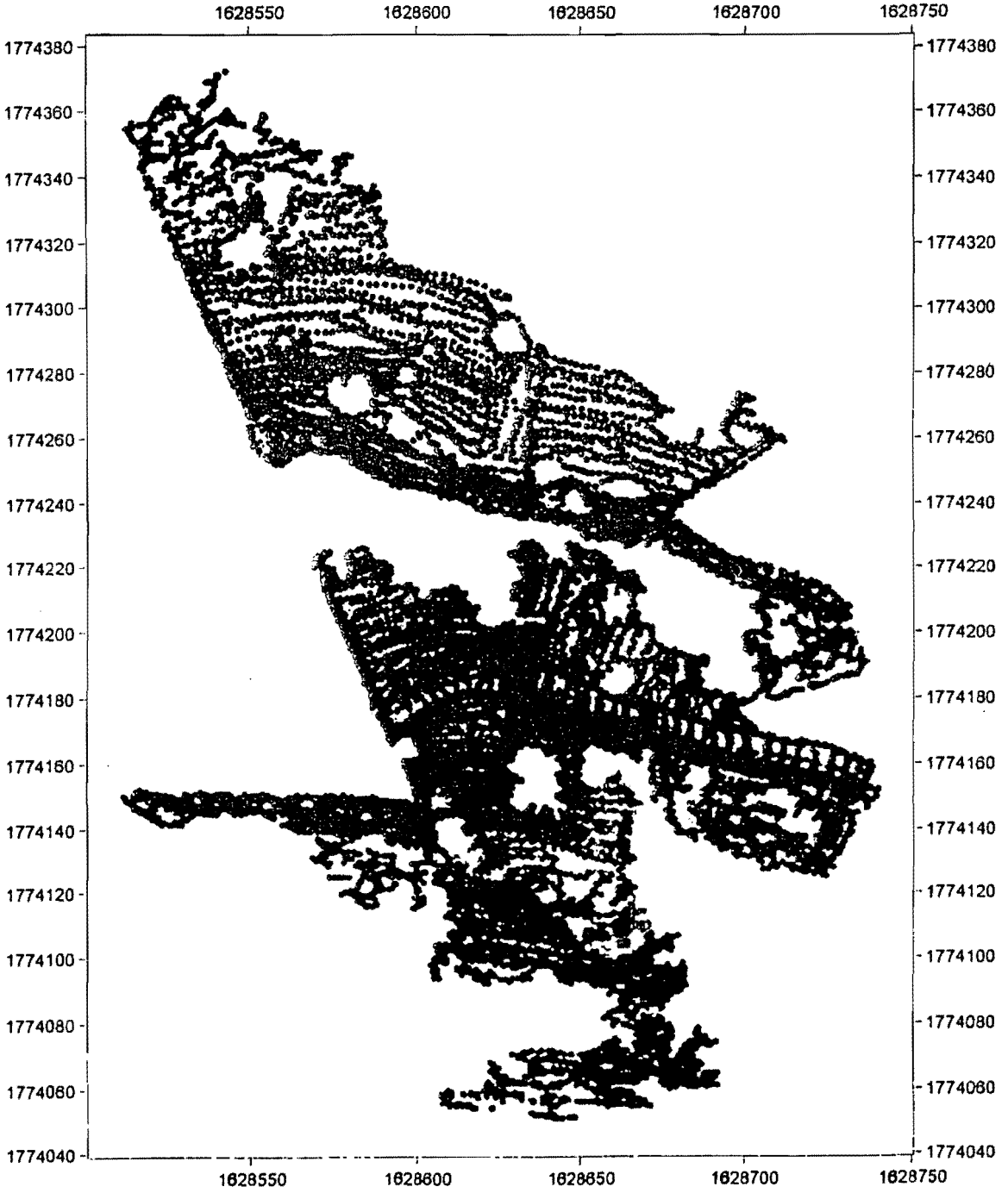
Site: OMEGA ()

Signal: NaI (cpm)

Time: 09:00:46 08/24/00

Threshold:
> 4000 •

< 4000
4000 to 6000
6000 to 8000
8000 to 10000
10000 to 20000
20000 to 50000
50000 to 100000
> 100000



11241.2459

FIGURE 4.3.2-2 PRS 02-009(A) SITE AND SURROUNDING AREA FOLLOWING SOIL EXCAVATION ACTIVITIES AND BEFORE SITE RESTORATION.

LOGGER Analyze v1.54m Track Map

Site: T21061 (D) Signal: NaI (cpm) Time: 13:24:40 10/06/00

Threshold:
> 4000 •

< 4000	10000 to 20000
4000 to 6000	20000 to 50000
6000 to 8000	50000 to 100000
8000 to 10000	> 100000

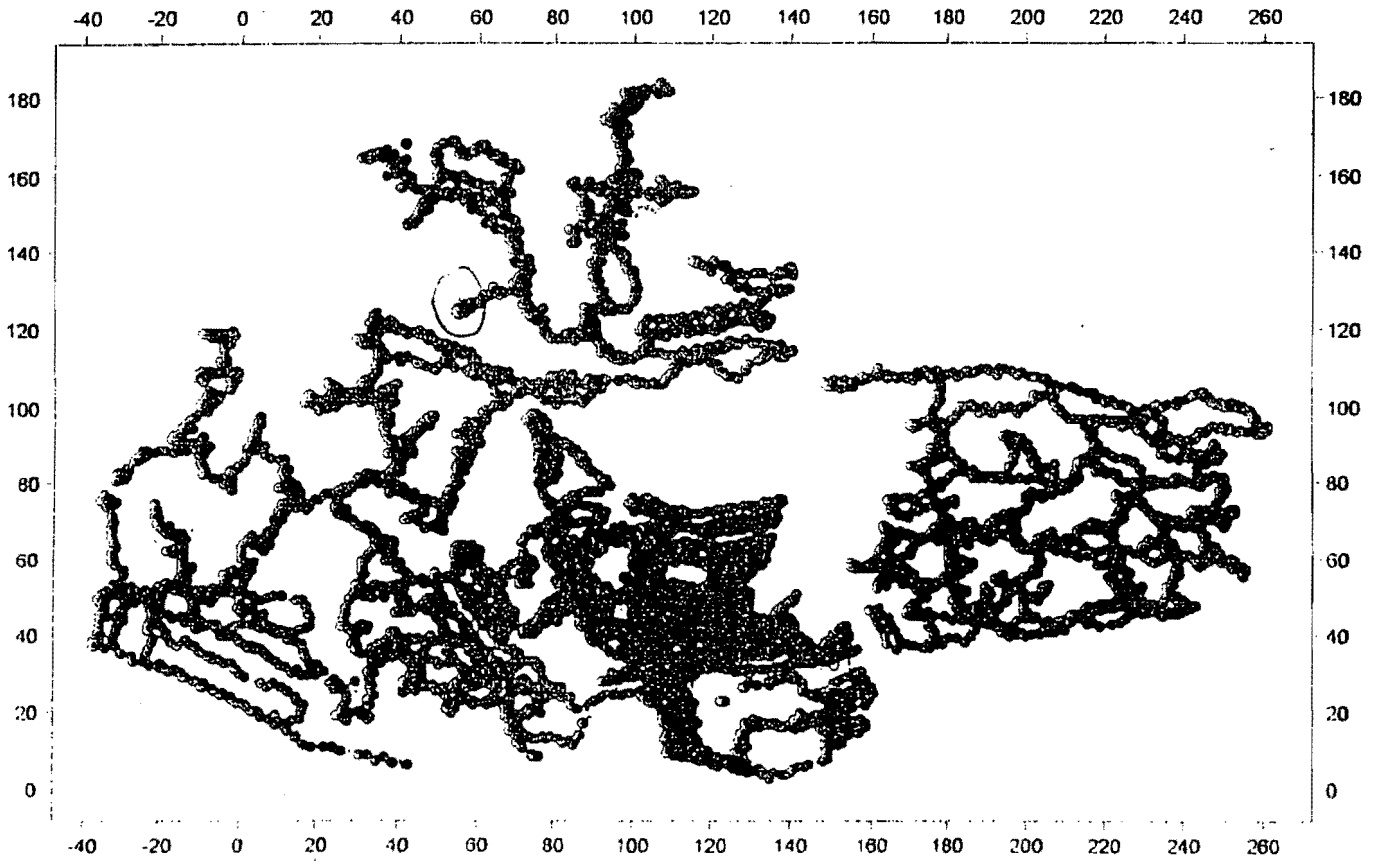


FIGURE 4.3.2-3 PRS 02-009(A) SITE AND SURROUNDING AREA AFTER SITE RESTORATION ACTIVITIES.

LOGGER Analyze v1.54m Track Map

Site: T210112 (A) **Signal: NaI (cpm)** **Time: 16:00:17 10/11/00**

Threshold:
> 4000 •

< 4000		**10000 to 20000**	
4000 to 6000		**20000 to 50000**	
6000 to 8000		**50000 to 100000**	
8000 to 10000		**> 100000**	

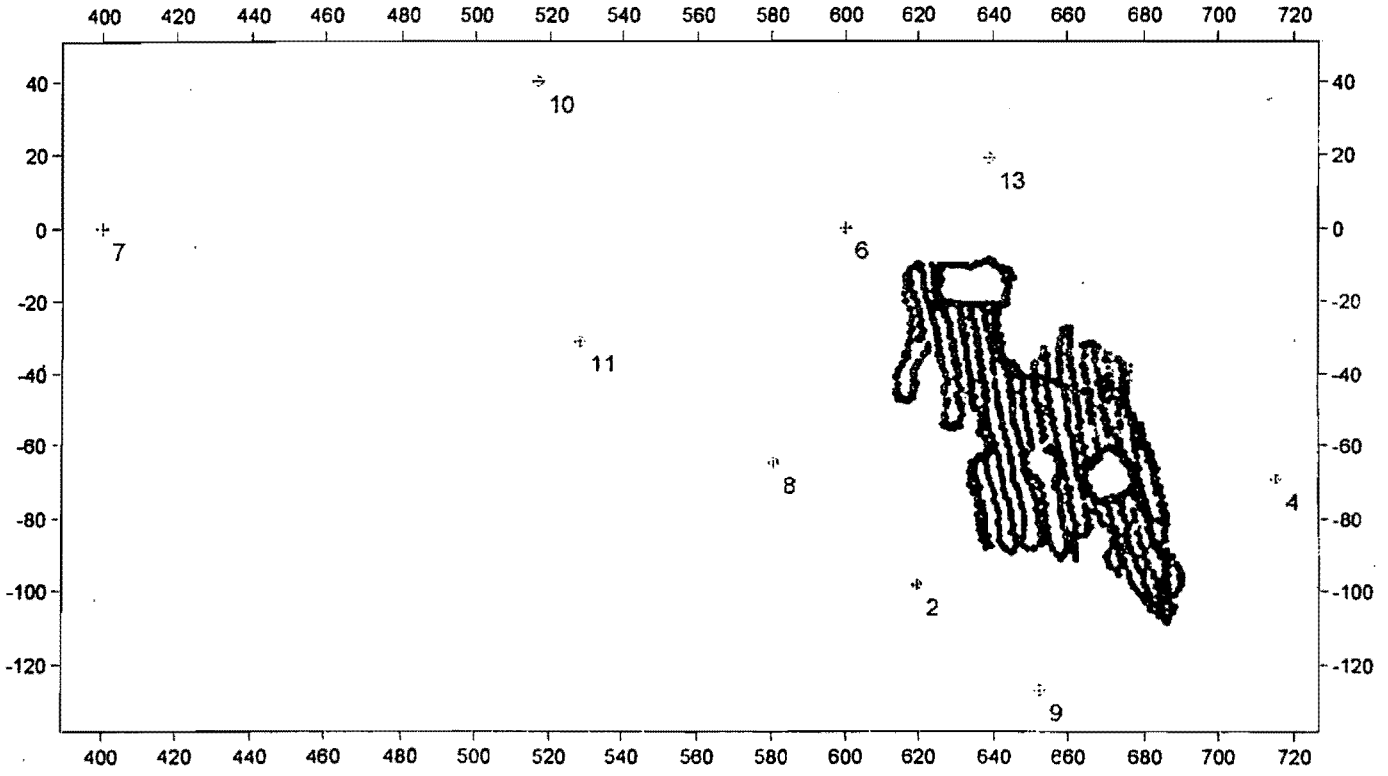


FIGURE 4.3.2-4 PRS 02-009(A) SITE AND AREA SOUTH OF OMEGA WEST REACTOR BUILDING FOLLOWING SOIL REMOVAL ACTIVITIES.

LOGGER Analyze v1.54m Track Map

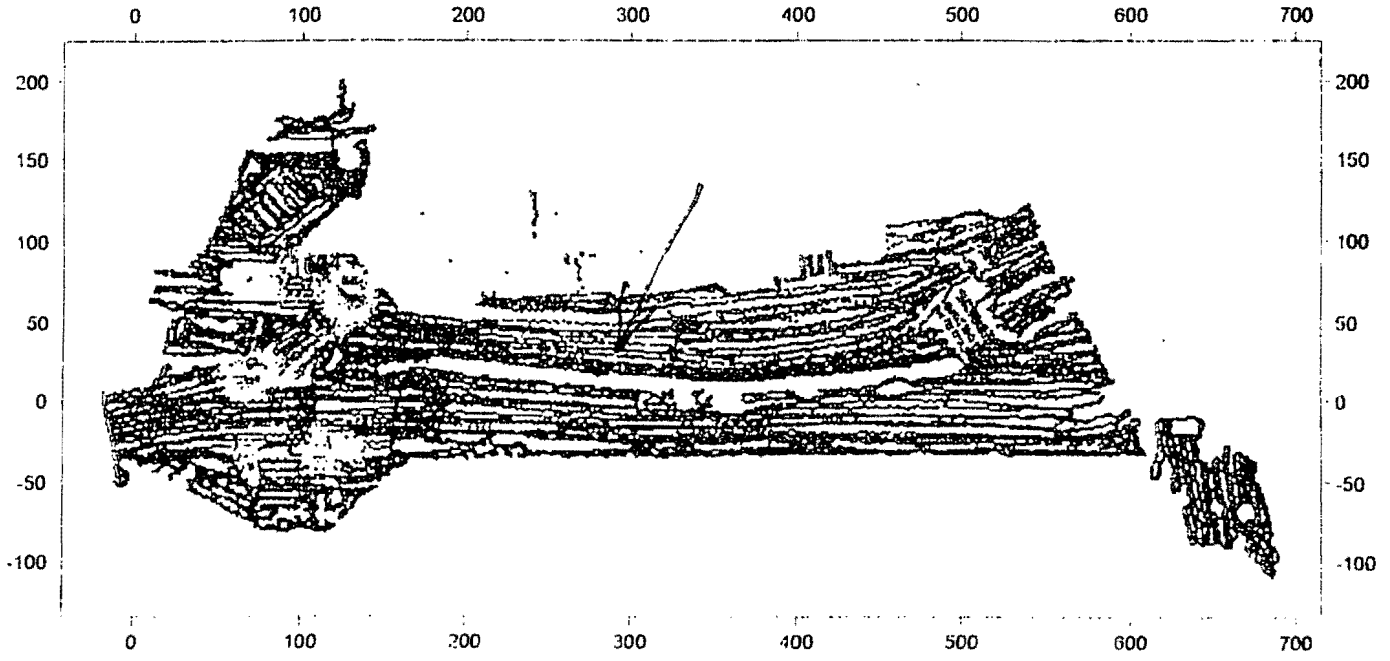
Site: O1011 ()

Signal: NaI (cpm)

Time: 11:11:53 10/11/00

Threshold:
> -4000

< 4000	10000 to 20000
4000 to 6000	20000 to 50000
6000 to 8000	50000 to 100000
8000 to 10000	> 100000



11242.2305

5.0 SITE STABILIZATION AND RESTORATION

Restoration of the metal nugget pile consisted of seeding and stabilization with jute matting on October 2, 2000. All areas disturbed as a result of drilling activities were restored using seed and straw mulch. This restoration was completed on October 5, 2000.

Site restoration of PRS 2-009(a) was completed on October 9 and 10, 2000 after ESH-1 walked the site and indicated that the postings could be taken down from the area.. Restoration consisted of backfilling with clean fill along the east and south sides of the boulder and then recontouring the entire disturbed area. Grass seed was spread and straw mulch applied to the entire PRS. The entire PRS was stabilized with jute matting. Photographs of sites following restoration are included in Appendix B.

6.0 DEMOBILIZATION

Demobilization from the work site was performed following release of heavy equipment by ESH-1 on October 11, 2000. Heavy equipment and field equipment were taken off site. A total of 17 B-12 boxes of soil, three roll off bins of soil and six 55-gallon drums of used personal protective equipment (PPE), plastic and sampling equipment waste remain on site. Peding processing of the waste profiles and chemical waste disposal requests (CWDR) these will be transported to TA-54 for disposal as LLW.

APPENDIX A

BOREHOLE LOGS

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | **CORE SAMPLE LOG**

Borehole ID 02-01225 TA~~00~~ 01 TA-02 Drill Depth From 0.0 To 15.0 Page 1 of 1

Driller S. Johnson, SBDC Box #(s) NA Start Date/Time 8/29/00, 1035 End Date/Time 8/29/00, 1150 hrs

Drilling Equip./Method CME-750, HSA/Core Sampling Equip./Method Core Barrel HSA/Continuous Core

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0	2.5/2.5		βγ= 550		0.0-4.5' Pale Brown (5YR 6/2) Silty Sand and Gravel. 20% silt. Dry, soft and Loose. Single Dacite cobble to 4" is Sub rounded - Rounded. No bedding.			start 1035
2.5	1.0/2.0		βγ= ~~611~~ 530					
5.0	0.0/0.5		—		4.5-5.0 No Recovery			center bit 4.5-5.0 (Boulders/cobbles)
	2.0/2.5		βγ= 545		5.0-7.5 Grayish Brown (5YR 3/2) Silty sand and gravel as (0-4.5') but moist to V. moist.			
7.5	0.0/0.5		—		7.5-8.0 No Recovery. Center bit.			center Bit 7.5-8.0 (boulder/cobbles)
	1.5/2.0		βγ= 560		8.0-9.0 Same as above. 9.0-10.0 Gray (N5) Tuff (cobble). Non-welded, well indurated. Prominant sani QTz. X-tals. Moist.			
10.0	1.5/2.5		βγ= 480		10.0-11.0 Grayish Brown 5YR 3/2, Silty Sand and Gravel. 15% silt, 45% Dacite cobbles are angular to sub rounded. Soft, Loose wet 11.0-11.5 Grayish Brown 5YR 3/2, clayey coarse sand. 30% clay. Subrounded coarse sand grains. No bedding Soft, Plastic V. moist-wet. Sand lower contact.			~10' core becomes wet.
12.5	2.5/2.5		βγ= 520		11.5'-15.0 Light Brown (5YR 6/4), Weathered Tuff. Non-Welded, poorly indurated. Pumice are not flattened and are gray N4-5. Black Lithics to 1cm (5%) are angular. Entire run is disaggregated. V. moist.			TD = 15.0' @ 1150 hrs
15.0								

Prepared by J Cook Date 8/29/00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 02-01226 TA/OU TA-02 Drill Depth From 0.0 To 15.0' Page 1 of 1

Driller S. Johnson, SBDC Box #(s) NA Start Date/Time 8/29/00, 1253 End Date/Time 8/29/00, 1510

Drilling Equip./Method CME-75D, HSA/Core Sampling Equip./Method Core Barrel HSA/Continuous Core

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0	2.0/2.5		βT= 349		0.0 - 2.0' Pale yellowish brown (10YR 6/2) Silty V. Fine sand. Dry, Soft, Loose. No bedding. ~25% silt.			Rig up @ 1245. 1253 Running in Nk.
2.5	0.0/2.5		NA		2.0-5.0' No Recovery			No Recovery 2.0-5.0 Cobble Stuck in shoe.
5.0	1.3/0.5		βT= 605		5.0 - 7.5' Brownish Gray (5 YR 4/1) Tuff. Non-Welded, V. well indurated, Prominant Qtz and San. phenocrysts. Pumice are DK to Med Gray (N4-N6) and are not Flattened.			5-5.5' V. hard drilling
	1.0/2.0		βT= 520					
7.5	0.75/1.0		βT= 399		7.5-8.25 Grayish Brown, (5YR 3/2) Fine Silty Sand, Grades to Silty Sandy Gravel. Top: 20% silt. Bottom: 20% silt, 20% Fine-med Sand, Gravel 2" and subrounded (dacite?) Wet, Soft-firm, Loose.			center Bit Through cobbles @ 8.5-9.0' Wore Tip off of center Bit.
	XXX	XXX	XXX		8.25-9.0 No Recovery.			
	0.25/1.0		βT 538		9.0-11.0 Grayish Brown (5YR 3/2). Silty Sand and Gravel. 20% silt, 30% m Sand and Gravel. No bedding. Dry, Soft-Firm and loose. Clasts are subrounded to ~2".			
10.0	2.0/2.5		βT= 622		11.0-15.0 Lt. Brown (5YR 6/6) Tuff. Strongly weathered. Non-welded and poorly indurated. (Core completely disaggregated) Slightly moist.			
12.5	1.5/2.5		βT= 598					TD = 15.0' @ 1510 hrs.
15.0								

Prepared by [signature] Date 8-29-00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | **CORE SAMPLE LOG**

Borehole ID 02-01227 ~~TA00~~ TA-02 Drill Depth From 0.0 To 15.0' Page 1 of 1

Driller S. Johnson, SBDC Box #(s) NA Start Date/Time 8/29/00, 1615 End Date/Time 8/30/00, 0815

Drilling Equip./Method CME-750, HSA/Core Sampling Equip./Method Core Barrel HSA/Continuous Core

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0	1.0/2.5		βγ= 370		0.0-3.5 Pale Red, 10R 6/2, ~~Sandy Silt~~ silty sand & 5% rounded pebbles, 20% silt, 80% fine sand. Grades downward to silty gravel and cobbles. Dry, loose. No Bedding.			1615 Running in hole from 0.0'
	40%	—	—					
2.5	1.5/2.5		βγ= 427					
					3.5-5.0' No Recovery			No Recovery. Drill cuttings in shoe.
5.0	2.4/2.5		βγ= 491		5.0-12.6 Pale Red 10R 6/2 Silty, coarse sand and gravel. 20% silt 50% coarse sand, 30% subrounded gravel. Tuff cobbles > 4" @ 7'. Dry, soft and loose to ~6.0'. Becomes moist below 6.2'. No bedding. Becomes Grayish red 10R 4/2 towards bottom.			0750 8-30-00 JC
								6.2' V. moist.
7.5	1.5/2.5		βγ= 476					
10.0	2.0/2.5		βγ= 441			▽		11.75' Saturated
					12.6-13.0 Grayish Red 10R 4/2, Silty/clayey coarse sand, subrounded qtz sand grains, 20% silt 15% clay. Soft, wet, loose.			
12.5	1.5/2.5		βγ= 488		13.0-16.0			0815 TD @ 15.0'
15.0								

Prepared by JCook Date 8-30-00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 02-01228 TA~~00~~ 95 TA-02 Drill Depth From 0.0 To 15.0' Page 1 of 1

Driller S. Johnson, SBDC Box #(s) NA Start Date/Time ~~8/29/10~~ 8/30/10 0930 End Date/Time 8/29/10 1030

Drilling Equip./Method CME-750, HSA/Core Sampling Equip./Method Core Barrel HSA/Continuous Core

Depth (feet)	Recovery (feet per feet / %)	Field Anaytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0	2.5/2.5		BG= 627		0.0-2.5' 5YR Grayish Red (10R 4/2) Sandy Silt. 20% Sand, 3% Gravel and Cobbles to 3". Firm and slightly moist. No bedding.			0930 Running in hole.
2.5	2.0/2.5		BG= 460		2.5-6.5 Grayish Red (10R 4/2) Sandy/Gravely Silt. 20% subrounded gravel, 20% c/s sand. DRY, soft and loose with No bedding.			
5.0								5.0-5.5 center Bit Through Cobbles. No Recovery.
	2.0/2.0		BG= 427		6.5-7.5 SP Grayish Red (10R 4/2). Silty/Sandy Gravel and cobbles. 15% sand 15% silt. Grey 07.5 Tuff and dacite cobble Firm, moist. No bedding.			
7.5	2.5/2.5		BG= 466		7.5-8.25 Grayish Red (10R 4/2) Gravely coarse silty Sand. 15% Silt, 15% Gravel (subrounded) 1 to 1/2". No bedding. Moist and Firm.			
					8.25-10.0 Grayish Red (10R 4/2) Sandy Gravel. 20% c/s sand and clast supported gravel and <2% cobbles are sub rounded. No Bedding. Moist to V. moist			Wet. Doesn't Run water.
10.0	2.5/2.5		BG= 418		10.0-11.5 Same as above but Wet. Matrix becomes slightly silty/clayey at Tuff contact.			
12.5	2.0/2.5		BG= 632		11.5-15.0 Grayish Orange-Pink (5YR 7/2) Weathered Tuff. Non-Welded, poorly indurated. Pumice to lem are not flattened. 1-2% Black/Gray lithics are angular and <1cm.			1030 TD = 15.0' bgs.
15.0								

Prepared by _____ Date _____ Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID 02-01339 TA~~OU~~ OC TA-02 Drill Depth From 0.0 To 15.0' Page 1 of 1

Driller S. Johnson, SBDC Box #(s) NA Start Date/Time 4/30/00 1120 End Date/Time 4/30/00, 1225

Drilling Equip./Method CME-75D, HSA/Core Sampling Equip./Method Core Barrel HSA/Continuous Core

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0	2.5/2.5		βγ= 458		0.0-6.5 Pale Yellowish Brown (10YR 6/2) crushed Tuff Fill. Dry, soft, loose. Becomes moist at 5.0'. This is fill material used to replace excavated sediments after VCP drain field removal. VCP pieces in core at 6.0-6.5'.			1120 Begin Drilling.
2.5	2.5/2.5		βγ= 680					
5.0	2.5/2.5		βγ= 552					
7.5	1.7/2.5		βγ= 431		6.5-10.0 Grayish Brown, (5YR 4/2) coarse silty sand and gravel. ~20% silt, <3% gray N4-5 tuff cobbles >4". Loose, Firm, and V. moist to wet.			9.2-10.0 wash.
10.0					10.0-10.5 No Recovery			10.0-10.5' center bit. No Recovery
	1.5/1.5		βγ= 552		10.5-12.0 Grayish Brown, (5YR 4/2) Silty Gravel. 15% silt, 25% Dacite cobbles which are rounded. wet. Firm, loose. No bedding.			
12.5					12.0-12.5 No Recovery			12.0-12.5 center bit. No Recovery.
	2.5/2.5		βγ= 391		12.5-15.0 Grayish Orange-Pink (5YR 7/2) weathered Tuff. Non-welded, poorly indurated. Pumice to 1cm are not flattened. Core completely disaggregated. Moist.			1225 hrs, TD @ 15.0'
15.0								

Prepared by J Locke Date 4/30/00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 03-01230 TA/OU TA-03 Drill Depth From 0.0 To 17.6 Page 1 of 2

Driller S. Johnson, SDC Box #(s) NA Start Date/Time 5/31/00, 0830 End Date/Time 6/31/00, 0930

Drilling Equip./Method CME-750, HSA/Core Sampling Equip./Method Core Barrel HSA/Continuous Core

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0	2.0 / 2.5		βγ = 447		0.0-7.5' Pale Yellowish Brown (10YR 6/2), Crushed Tuff Fill. Dry, soft and Loose. With uncrushed pieces of Tuff to ~1-2" (~5%). This is part of a mound of crushed Tuff used to cover the excavated area where a drain field was removed.			0830 Start Drilling.
2.5	1.5 / 2.5		βγ = 425					2.0-2.5 Loss
5.0	2.0 / 2.5		βγ = 521					
7.5					7.5-8.0 No Recovery			7.5-8.0 Center Bit No Recovery.
	2.0 / 2.0		βγ = 569		8.0-10.0 Pale Brown (5YR 6/2) silty Coarse Sand and Gravel. 20% silt, 40% subrounded crs sand grains, 40% gravel/cobbles are subangular to subrounded. No bedding, Firm, moist. 6my Tuff cobble >4" @ 8.5'.			
10.0	1.5 / 1.5		βγ = 466		10.0-11.0 Pale Brown, (5YR 6/2), Silty fine-med. Sand. V. Moisy-Wet. Moderately-sorted. No bedding. 15% silt. Soft and Loose.			10.5' V. Moist-Wet
					11.0-15.0 Pale Brown (5YR 6/2) Silty Coarse Sand and Gravel. 15% silt, Subrounded gravel to 1.5", sand grains are sub Rounded. Moist. to wet. Firm, Loose. No Bedding.			11.5-12.6 Center Bit No Recovery.
15.0	1.5 / 2.5		βγ = 495					14-15 Loss.
17.5								

Prepared by D Cocker Date 5/31/00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | **CORE SAMPLE LOG**

Borehole ID 02-01230 TA~~DD~~ 9c TA-02 Drill Depth From 0.0 To 17.5 Page 2 of 2

Driller S. Johnson, SRDC Box #(s) NA Start Date/Time 8/31/00, 0430 End Date/Time 8/31/00 9c 0930

Drilling Equip./Method CME-750 HSA/Core Sampling Equip./Method Core Barrel, HSA / Continuous core

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
15.0	2.5 / 2.5		BV= 548		15.0-16.3 ~~Silty~~ Pale Brown (5YR 5/4) Silty sand and gravel. ~30% silt, 2-5% clay, Saturated. Angular gravel to 1.5". Soft. Loose - slightly plastic. No Bedding			
17.5					16.3-17.5 Grayish orange-pink (5YR 7/2) Weathered TUFF. Non-welded, poorly indurated. Pumice to 1cm are Not flattened. Moist.			TD=17.5 @ 0930
20.0								
22.5								
25.0								
27.5								
30.0								

Prepared by [signature] Date 8/31/00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 02-01231 TA/OU ~~OC~~ TA-02 Drill Depth From 0.0 To 160 Page 1 of 1

Driller S. Johnson, SDC Box #(s) NA Start Date/Time 8/31/00, 1005 End Date/Time 8/31/00, 1340

Drilling Equip/Method CME-750, HSA/Core Sampling Equip./Method Core Barrel HSA/Continuous Core

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0	2.5/2.5		BG= 60		0.0-5.0, Pale Yellowish Brown (10YR 6/2), Crushed Tuff Fill. Dry soft and loose.			1005 Running in Hole from 0.0' 2.5' Nail in Fill Material.
2.5	2.5/2.5		BG= 525					
5.0	1.5/2.0		BG= 850		5.0-7.0 Grayish Brown (10YR 5/2) Silty Coarse Sand and Gravel. 20% silt, 30% angular Gravel to 1.5". Matrix supported. No Bedding, Firm, slightly moist and Loose, Single Tuff cobble >4" in sample.			
					7.0-7.5 No Recovery			7.0-7.5 No Recovery. Center Bit Taking Cobbles.
7.5	2.5/2.5		BG= 602		7.5-10.0 Grayish Brown, (10YR 5/2) Gravely Sand. 25% angular gravel w/ 5% Silt. No Bedding. Loose, Slightly moist → moist.			
10.0	2.0/2.5		BG= 485		10.0-11.5 Grayish Brown (10YR 5/2) Gravely coarse sand. 15% angular gravel to 1.5", 10% Silt. Loose, Firm, V. moist to wet.			
					11.5-12.0 Same as above with clays increasing to ~10% by 12.0'. Wet.			12.0m 12.5 Loss.
12.5	0.5/0.5		BG= 355		12.0-12.5 No Recovery Loss.			
	2.0/2.0		BG= 446		12.5-14.5 Grayish Brown 10YR 5/2, Silty/Gravely coarse sand. Gravel ~15% is 1.5" and sub-rounded Tonguler. 15% silt. Soft, Loose Saturated.			1105 Sampler Stuck in angels cut wireline + Tri out.
15.0					14.5-15.0 Grayish orange PINK ~~and~~ (5YR 7/2), Tuff. Weathered. Non-Welded. Poorly indurated.			1315 Repairs complete.
								1340 TD @ 15'

Prepared by [signature] Date 8/31/00. Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 02-01232 TA 00 TA-02 Drill Depth From 0.0 To 15.0 Page 1 of 1

Driller S. Johnson, SBDC Box #(s) NA Start Date/Time 5/31/00, 1430 End Date/Time 5/31/00 1530

Drilling Equip./Method CME-750, HSA/Core Sampling Equip./Method Core Barrel HSA/Continuous Core

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0	2.3/2.5		βT= 418		0.0-7.0 GC/GT Grayish Red 10R 6/2 Crushed Tuff Fill. Pieces of tuff >4" Diam. Dry, Soft and Loose.			1416 Begin Drilling.
2.5	2.4/2.5		βT= 423					
5.0	2.0/2.5		βT= 478					
7.5	2.5/2.5		βT= 529		7.0-11.0 Grayish Brown (5YR 3/2) Coarse Silty/Gravely Sand. 20% silt and 20% Gravel/Cobbles 1.5"->4" Cobbles are mostly Gray Tuff (well indurated). No Bedding, Dry to slightly moist. Firm.			
10.0	1.0/1.0		βT= 390					
					11.0-12.5 No Recovery.			11-12.5' center bit through/around cobbles.
12.5	2.5/2.5		βT= 420		12.5-14.5 Same as 7.0-11.0' Moist.			
15.0					14.5-15.0 Grayish orange Pink 5YR 7/2 Tuff. Weathered. Non-Welded, Poorly indurated. Core is disaggregated. Moist.			1530 TD @ 15.0'

Prepared by [signature] Date 5/31/00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID 02-01233 TA/OU TA-02 Drill Depth From 0.0 To 17.5 Page 1 of 2

Driller S. Johnson, SBDC Box #(s) NA Start Date/Time 0920, 9/1/00 End Date/Time 1600, 9/1/00

Drilling Equip./Method CME-750, HSA/Core Sampling Equip./Method Core Barrel HSA/Continuous Core

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0	2.3/2.5		BG 555 dpm		0.0-5.0' Pale Red (10R 6/2) Crushed Tuff Fill. Dry Soft Loose. No bedding. Pieces of tuff to 1.5".			0920 9/1/00
2.5	2.5/2.5		BG= 495 dpm					
5.0	2.5/2.5		BG 615 dpm		5.0'-8.5' Silty, Gravely med-Fine Sand. Grayish Red (10R 4/2) Dry, Loose Firm. 25% each silt and gravel. Gray (N6) Tuff cobbles > 4" (<10%).			
7.5	2.5/2.5		BG 424 dpm		8.5- Grayish Red (10R 4/2), Silty, Gravely Coarse Sand. ~25% each silt and Gravel. Gravel is sub rounded. Gray (N6) Well indurated Tuff cobbles > 4".			8.5' wet
10.0								10.0-11.0 Center Bit
11.5	1.5/1.5		BG= 579 dpm					
13.0	0.5/1.0		BG= 359 dpm					13.5-14.0 Center Bit.
14.0	1.0/1.0		BG= 523 dpm					

Prepared by _____ Date _____ Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 02-01133 TA/OU TA-02 Drill Depth From 0.0 To 17.5 Page 2 of 2

Driller S. Johnson, SDC Box #(s) NA Start Date/Time 0820, 9/1/00 End Date/Time 1000, 9/1/00

Drilling Equip./Method CME-750 HSA/core Sampling Equip./Method Core Barrel, HSA / continuous core

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
15.0	2.5/2.5		β ND 491 dpm		-17.5 Grayish orange pink (5YR 7/2) strongly weathered Tuff. Non-welded, poorly indurate, moist. Core completely disaggregated from drilling.			
17.5					TD @ 17.5' bgs			
20.0								
22.5								
25.0								
27.5								
30.0								

Prepared by _____ Date _____ Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 00-01234 TA~~00~~ 16 TA-02 Drill Depth From 0.0 To 17.5 bgs Page 1 of 2 1/2

Driller S. Johnson, SBDC Box #(s) NA Start Date/Time 9/16/00, 1105 End Date/Time 9/16/00 1205

Drilling Equip./Method CME-750, HSA/Core Sampling Equip./Method Core Barrel HSA/Continuous Core

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0	2.5/2.5		βg = 546 dpm		0.0-4.8' Pale Red (10R 6/2) Crushed Tuff Fill. Dry soft Loose. No Bedding. Pieces of tuff to ~2".			1105 Running in from 0.0
2.5	2.5/2.5		βg = 549 dpm					
5.0	2.0/2.5		βg = 785 dpm		4.8'-7.5' bgs Dark Gray N4 coarse Sandy, V. Coarse Silt-Fine Sand. Mixes ~5% angular gravel. Silt-F sand ~70% Crs Sand ~25%. Slightly moist. Firm.			Less cobbley at the location. No Center Bit Required.
7.5	1.75/2.5		βg = 634 dpm		7.5'- 12.5 Gravely, Silty F-Crs sand. Grayish red (10R 4/6). Grades from above Lithology. 20% each subrounded gravel and Silt, loose, Firm, moist.			
10.0	1.5/2.5		βg = 723 dpm		12.5-17.5 No Recovery. Contact with weathered tuff at ~15' bgs as indicated by cuttings and drilling action.			12.5-15' Towards end of Run started seeing weathered tuff cuttings. Soft tuff contact at 15'
12.5	0.0/2.5		—					
15.0								

Prepared by _____ Date _____ Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID 02-01235 TA~~00~~ 02 TA-02 Drill Depth From 0.0 To 17.5 Page 1 of 2

Driller S. Johnson, SDC Box #(s) NA Start Date/Time 9/15/00 1005 End Date/Time 9/15/00 1135

Drilling Equip./Method CME-750 HSA/Core Sampling Equip./Method Core Barrel HSA/Containers etc

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core In Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0	1.0/2.5		BG= 555 dpm		0.0-5.5 Reddish Brown 10R 4/4, Silty F-med grain Sand and gravel/ Cobbles to >2.5". No Bedding. Cobbles are sub angular to sub-rounded. Dry-slightly moist. 15% silt. Soft. Loose.			(0-coarse) South of creek 9/15/00 1005 Begin drilling
2.5	2.0/2.5		BG= 455 dpm					1.5-2.5 Loss
5.0	0.5/1.5		BG=500 dpm		5.5-6.0 No Recovery			5.5-6.0 Center Bit through Cobbles.
	1.5/1.5		BG= 464 dpm		6.0-7.5 Grayish Red (10R 4/2), Fine Sand and gravel. 20% subangular gravel. Matrix supported. Tuff cobble to 6" diam @ 7.0'. No Bedding loose soft and slightly moist.			
7.5					7.5-8.5 No Recovery			7.5-8.5 Center bit through cobbles.
	1.0/1.5		500		8.5-10.0 Same as 6.0-7.5'			
10.0	0.0/2.5		BG= 400 dpm		10.0-13.5 Moderate Brown, (5YR 3/4), Med. Sand and gravel. 25% subangular Gravel. 10% Silt. Firm. No Bedding. 13.5-13.7 Moderate Brown (5YR 3/4) Fine silty Sand. ↓ Moist Moderate sorting. No Bedding; Soft, Loose.			
12.5	1.2/2.5		BG= 500 dpm		13.7-15.0 Moderate Brown (5YR 3/4) Med Sand gravel and Cobbles. 30% Gravel + Cobbles to >4" ↓ Moist to Wet. No bedding. Firm, Loose.			
15.0								

Prepared by _____ Date _____ Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 02-01135 TA~~00~~ 02 TA-02 Drill Depth From 0.0 To 17.5 Page 2 of 2

Driller S. Johnson, SDC Box #(s) NA Start Date/Time 9/5/00 1005 End Date/Time 9/5/00 @ 1135

Drilling Equip./Method CME-75 HSA/core Sampling Equip./Method Core Barrel, HSA / Continuous core

Depth (feet)	Recovery (feet per feet / %)	Field Anaytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
15.0	8.0 / 0.5		BP = 550 dpm		15.0-17.5 grayish orange-Pink (5YR7/2), Tuff, strongly weathered, moist. Non-welded and poorly indurated. Core completely disaggregated by drilling.			
17.5					TD = 17.5' bgs @ 1135.			
20.0								
22.5								
25.0								
27.5								
30.0								

Prepared by _____ Date _____ Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | **CORE SAMPLE LOG**

Borehole ID 03-01136 TA-08 02 Drill Depth From 0.0 To 17.5 Page 1 of 2

Driller S. Johnson, SBDC Box #(s) NA Start Date/Time 9/5/00, 1405 End Date/Time 9/5/00, 1640

Drilling Equip./Method CME-750, HSA/Core Sampling Equip./Method Core Barrel HSA/Continuous Core

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0	2.0/2.5		350 dpm		0.0-4.0 Pale Brown (5YR 5/2) V. Fine Sand and gravel. Poorly Sorted. No bedding. Pebbles to 1.5" (20%), 10% silt, Cobbles ~ 4" (3%). Soft, Loose, Dry. Cobbles are sub angular to subrounded.			
2.5	1.5/1.5		600 dpm		4.0-5.0 No Recovery (Center Bit)			4-5 CB
5.0	2.5/2.5		450 dpm		5.0-8.0 Pale Brown (5YR 5/2), V. Fine silty sand w/ 20-25% gravel and cobbles to at least 4" diam. Clasts are subangular to subrounded. No bedding, Dry Soft Loose.			
7.5	0.5/1.5		400 dpm		8.0-8.5' No Recovery. (Center Bit)			8-8.5 CB
	1.5/1.5		600 dpm		8.5-11.0. Pale Brown (5YR 5/2), Silty f-M sand (w/ 25%) cobbles and gravel, (>3" diam). Cobbles subangular to subrounded. No bedding.			
10.0	0.5/1.0		400 dpm		11.0-11.5 No Recovery. (Center Bit.)			11-11.5 CB
	0.5/1.0		450 dpm		11.5 - 14.5 Grayish-Brown, Med-Fine Silty Sand, 10% subangular pebbles-cobbles > 4". No Bedding. Moist, Loose, Soft.			
12.5			4500 ppm		14.5-15.1' Moderate Brown (5YR 4/4) Coarse sand and gravel. Subrounded cobbles >3". No Beddding. Soft Loose Wet.	▽		Perched zone.
15.0								

Prepared by J. Crocker Date 9/5/2000 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID CO-01236 TA-2 Drill Depth From 0.0 To 17.5 Page 2 of 2

Driller S. Johnson Box #(s) — Start Date/Time 9/5/00, 1405 End Date/Time 9/5/00, 1640

Drilling Equip./Method CME-750/HSA Sampling Equip./Method Cont. Core / Wireline Core Barrel

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
15.0	X		400dpm		15-16' No Recovery center bit			15-16'
	1.0 / 1.0				17.2'-17.5' Tuff. Grayish orange Pink (5YR 7/4). Weathered, non-welded poorly indurated to moderately indurated. Pumice to 10 cm are not flattened. moist.			
17.5'					TD = 17.5' Bgs.			

Prepared by J. Crocker Date 9/5/00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 02-01237 TA/OU TA-2 Drill Depth From 0.0 To ____ Page 1 of 1

Driller S. Johnson, SBDC Box #(s) NA Start Date/Time 0825 9/6/00 End Date/Time 0905 9/6/00

Drilling Equip./Method CME-750, HSA/Core Sampling Equip./Method Core Barrel HSA/Containers etc

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0	1.5/2.5	CA02-00-0123 0-1.0'	420 dpm		0.0-8.75 Grayish Brown (5Y 3/2), Fine sand and gravel. 15% angular gravel 5% cobbles (subrounded) 5% silt. No Bedding. soft moist Loose cobbles To 3".			PRS 2-00310
2.5	2.5/2.5	CA02-00-0124 3.0-3.5'	364 dpm		8.75-10.0 Gray (N5) Tuff. Non Welded moderately Indurated. Prominent Phenocrysts of San. + Qtz To 1.5 mm.			
5.0	2.0/2.5		347 dpm					
7.5	2.5/2.5	CA02-00-0125 4.0-4.75						
10.0					TD @ 10.0' @ 0905			
12.5								
15.0								

Prepared by J. Crocker Date 9/6/00 Checked By: ____ Date ____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 02-01238 TA-00 02 Drill Depth From 0.0 To 15.0' Page 1 of 1

Driller S. Johnsen, SDC Box #(s) NA Start Date/Time 9/6/00, 1050 End Date/Time 9/6/00, 1230

Drilling Equip./Method CME-750, HSA/Core Sampling Equip./Method Core Barrel HSA/Containers core

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0	1.0 / 2.5	1002-00-0044 (0-1.0)	537 dpm		0-5.0' Pale Brown (5YR 5/2) Fine Sand and Gravel. 20% gravel + cobbles to >4" are subrounded to subangular and mostly well indurated Tuff. No bedding. Dry soft loose. 7% silt.			
2.5	1.5 / 3.5	1002-00-0047 (2.5-4.0)	515 dpm					
5.0					5.0-6.0 No Recovery (Center Bit).			5.0-6.0 center Bit.
6.0	1.0 / 1.5		505 dpm		6.0-10.0 Pale Brown (5YR 5/2) Silty fine sand and gravel. 15% gravel and cobbles to >4" are subrounded. 20% silt. No bedding. Dry soft Loose.			
9.5	2.5 / 2.5		525 dpm					
10.0					10-11 No Recovery. Center Bit.			10-11 center bit.
11.0	1.3 / 1.5		520 dpm		11.0-12.5 Pale Brown (5YR 5/2). Med grained sand and gravel/cobbles. Clasts as large as 3.5" are subrounded. No bedding. moist soft loose.			
12.5					12.5-14.0 No Recovery (Center Bit).			12.5-14.0 Center Bit
14.0		1002-00-0048 (14.0-14.75)	505 dpm		14.0-14.75 Silty fine sand and gravel Pale Brown (5YR 5/2). Gravel to 3" sub rounded. Soft loose No Bedding moist. 14.75-15.0 Gray Tuff. Non-welded. Well indurated. Pumice are not flattened moist.			TD @ 15.0'
15.0					TD = 15.0'			

Prepared by J. Rocker Date 9/6/00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID 03-01239 TA/OU _____ Drill Depth From 0.0 To 15.0 Page 1 of 1

Driller S. Johnson-SDC Box #(s) NA Start Date/Time 9/6/00, 1440 End Date/Time 9/7/00 1100

Drilling Equip./Method CME-750, HSA/Core Sampling Equip./Method Core Barrel HSA/Containers Core

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0	2.5 / 2.5	CAD-00-0309-00 0309-10	430 dpm		0.0 - 2.5 Pale Brown (5YR 5/2) Crushed Tuff Fill. Dry soft loose.			PRS 2-011(b)
2.5	2.0 / 2.0	CAD-00-0309 30-40	430 dpm		2.5 - 5.0 Pale Brown (5YR 5/2). Silty f-m sand and gravel. ~15% silt. Poorly sorted gravel subrounded to ~2" diam. Dry soft loose			
5.0	2.0 / 2.5	CAD-00-0310 10-15	490 dpm		5.0 - 7.5' Pale Brown (5YR 5/2) F-coarse sand and gravel clasts to 4" are subrounded. Moist to V. moist. No Bedding. Soft and loose.			
7.5	1.0 / 2.5		400 dpm		7.5' - 11.0' F-M Sand and Gravel; Pale Brown (5YR 5/2), clasts to 4" are subrounded. V. Moist. No Bedding, Soft & loose. 11-11.5' center Bit No Recovery.			
10.0	1.0 / 1.0		350 dpm		11.5 - 14.0 Same as above but V. Moist TO WET.			11.0 - 11.5 center bit
15.0	1.0 / 1.0	CAD-00-0311 115-130			14.0 - 15.0: Grayish orange pink (5YR 7/2) Weathered tuff. Non-welded, poorly indurated. Pumice to ~1.0 cm are not flattened V. Moist.			
		CAD-00-0312 14-15			TD = 15.0'			Backfilled w/ 3/4 chips.

Prepared by J. Rieker Date 9/7/00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 02-01240 TA/PO TA-2 Drill Depth From 0.0 To 22.5 Page 1 of 2

Driller S. Johnson Box #(s) — Start Date/Time 9/7/00, 1130 End Date/Time 9/7/00, 1445

Drilling Equip./Method CME 750, HSA Sampling Equip./Method Core Barrel, Cont. Core

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core In Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0	2.5/2.5	CA02-00-0131	BG 490 dpm		0.0 - 5.5' Grayish Brown 5YR 3/2, Silty, Fine - Med grained sand. Fill Material With 1" pieces of asphalt, Metal debris includes wire and rad(?) Pieces of metal sheeting. Slightly Moist, Soft and Loose.			1135 Running in hole
5.0	2.0/2.5	CA02-00-0132	BG= 530 dpm		5.5 - 7.2 Moderate orange pink Crushed tuff Fill material. Soft Loose and slightly moist.			
	1.5/2.2	CA02-00-0133 6-7'	BG= 1000 dpm		7.2 - 7.5 No Recovery.		Fill	
7.5		OA02-00-0134 9.5-10'	BG= 4000 dpm		7.5 - 10.0 Grayish Brown 5YR 3/2 Silty Sand and gravel. Subangular gravel to 1.5" (15%). Dry - Slightly moist. No Bedding. Loose.		Sed.	7.2 - 7.5 cratar Bit.
10.0		CA02-00-0135	1000		10.0 - 19.5 Grayish Brown 5YR 3/2 Coarse - Med sand gravel and silt. No Bedding. Soft and Loose. Moist To Saturated at ~19'. Gravel are Sub angular to Subrounded To 1.5".			
12.5			800					
15.0								

Prepared by [signature] Date 9/7/00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 02-01240 TA/OU TA-2 Drill Depth From 0.0 To 22.5 Page 2 of 2

Driller S. Johnson Box #(s) ~ Start Date/Time 9/7/00, 1130 End Date/Time 9/7/00, 1445

Drilling Equip./Method CME 750, HSA Sampling Equip./Method Core Barrel, cont. core.

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
5.0	2.5/2.5	GA02-00-0136	βγ 800 dpm		19.5-22.5 Grayish orange pink 5YR 7/2 Weathered Tuff. Non-Welded and Poorly indurated. Moist. Pumice ~1cm are not flattened. Tuff is the perching horizon. No impermeable clay @ contact with beds above.			
15	2.0/2.5	GA02-00-0137 19.5-19.5'	βγ 600 dpm			▽		Wet/saturated ~18' to contact w/ Tuff.
20.0	2.0/2.5	GA02-00-0138 21.5-22.5'	βγ 600 dpm		TD = 22.5'			
22.5								

Prepared by [signature] Date 9/7/00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 02-01241 TA/OU TA-01 Drill Depth From 0.0 To 17.5 Page 1 of 2

Driller S. Johnson Box #(s) — Start Date/Time 9/7/00, 1545 End Date/Time 9/8/00, 0850

Drilling Equip./Method CME-750 Sampling Equip./Method Core Barrel / Cont. Core

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0	2.0/2.5	CA02-00-0139 0-0.5'	βγ= 500 dpm		0.0-2.5' Pale Brown 5YR 5/2, Silty fine sand and gravel. Poorly Sorted. Soft Dry loose. 12-20% gravel to 10" (Rounded).			9/7/00 1545 Running in hole.
5	2.0/2.5	CA02-00-0140 3.0-4.0'	βγ= 650 dpm		2.5-6.0 Grayish Brown 5YR 3/2, Gravely-Silty fine sand. No Bedding. Soft, Moist and loose. Subangular gravel to ~2". 6.0-7.5 No Recover. 7.5-11.5 Same as 2.5'-6.0' above.			6.0-7.5' Loss.
10	1.0/2.5		βγ 600					
15	1.5/2.5	CA02-00-0141 7.5'-9.5'	βγ= 700		11.5- 17.5 Pale Brown 5YR 5/2, Coarse cobbley sand. 25% cobble and gravel to >4" are subrounded. Soft Loose w/ No bedding. 5% silt. Moist to Wet at 16' TD=17.5.			11.0-11.5 16:15 hrs Center Bit through Cobbles No Recovery.
	1.0/1.0		βγ= 820					
	1.0/1.0	CA02-00-0142						
	1.5/2.5		—					

Prepared by [signature] Date 9/8/00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 02-01241 TA/OU TA-02 Drill Depth From 0.0 To 17.5 Page 2 of 2

Driller S. Johnson Box #(s) — Start Date/Time 9/7/00 1545 End Date/Time 9/8/00, 0850

Drilling Equip./Method CME-750, HSA Sampling Equip./Method Core Barrel / Cont. Core

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
5	0.5 / 0.5	CA02-00-0143	β γ- 700		TD = 17.5'			15.5-16 control Bit.
	1.5 / 1.5							
7.5								

Prepared by [signature] Date 9/8/00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | CORE SAMPLE LOG

Borehole ID 02-01242 TA-2 Drill Depth From 0.0 To 17.5 Page 1 of 2

Driller S. Johnson Box #(s) — Start Date/Time _____ End Date/Time _____

Drilling Equip./Method CME-750/HSA Sampling Equip./Method Cont. Core / Wireline Core Barrel

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0		CAO2-00-0144 0-1'	βγ- 500 dpm		0.0 - 5.0 Pale Brown (5YR 4/2) Gravely, Fine Silty Sand. Clasts to 2" are angular to sub-angular. Soft Loose, No Bedding. Moist.			
0.5			βγ= 530 dpm					
5.0		CAO2-00-0 6'-7'	βγ= 530 dpm		5.0 - 7.5' Pale Brown (5YR 4/2) Fine Sand, soft moist Loose. No Bedding 5% silt, 5% subRounded Pebbles < 1.0".			
7.5			βγ= 600 dpm		7.5 - 15.0 Cobbley M-CRS sand. 5YR 3/2 Grayish Brown. Subrounded gravel to cobbles >4" ~ 20%. Soft Loose moist w/ no Bedding.			
10.0	0.5/2.0	CAO2-00-0147 10.5-14.5	βγ= 450 dpm					10.0 - 10.5 Center bit
12.5	0.5/2.0		βγ= 460 dpm					14.5 - 15 Center Bit
15.0								

Prepared by [signature] Date 9/7/00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | **CORE SAMPLE LOG**

Borehole ID 00-01141 TA~~00~~ 2c TA-2 Drill Depth From 0.0 To 17.5 Page 2 of 2

Driller S. Johnson Box #(s) — Start Date/Time _____ End Date/Time 9/6/00 1010.

Drilling Equip./Method CME-750/HSA Sampling Equip./Method Cont. Core / Wireline Core Barrel

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
15.0	1.5 / 2.5	CA00-00-01141 (15-16')	BG = 550 dpm 555 9/6/00		15.0-17.5' Grayish Brown 5YR 3/2 Coarse Sand and cobbles, minor <10% silt. cobbles are subrounded. to >4.0" V. Moist to wet @ ~16'			V. moist - wet. Not saturated.
17.5					TD = 17.5' at 1010 hrs			

Prepared by [signature] Date 9/6/00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | **CORE SAMPLE LOG**

Borehole ID CQ-9243 TA~~OU~~ TA-2 Drill Depth From 0.0 To 14.5 Page 1 of 1

Driller S. Johnson Box #(s) — Start Date/Time 9/5/00 1000 End Date/Time 9/5/00 1310

Drilling Equip./Method CME-750/HSA Sampling Equip./Method Cont. Core / Wireline Core Barrel

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0	1.0 / 2.5	CAQ-00-0174	B/γ 560 dpm		0.0-7.5 Pale Brown, 5YR 5/2, Silty V. fine-Med Sand. 15% silt. Dry, Soft, loose. No Bedding			
2.5	1.5 / 2.5	CAQ2-00-0175 3'-4'	Bγ 600 dpm					
5.0	2.0 / 2.5	CAQ-00-0176 5'-7'	Bγ 550 Dpm					
7.5	1.5 / 2.0 Use		Bγ 500 dpm		7.5-9.0 Pale Brownish Yellow 10YR 6/2, F-Med Sand. 5-10% silt. 15% gravel To ~1.5" (subangular). Dry soft loose with no bedding.			
10.0					9.0-10.0 No Recovery.			center bit 9'-10'
	2.5 / 2.5	CAQ-00-0177 11.5-12.5'	B/γ 460 dpm		10.0-12.5 Grayish orange 10YR 7/4 Med-Coarse Sand and pebbles. 20% Pebbles (subangular-subRounded) are ~1.0" diam. 5-10% silt. Dry loose soft. No bedding.			
12.5	1.5 / 1.5	CAQ-00-0178 13-14'	Bγ= 450 dpm		12.5-14 Pale Brownish yello 10YR 6/2 Coarse silty sand and cobbles. Slightly moist. Cobbles of well indurated Tuff > 4" gravel is subangular. No Bedding Loose.			
15.0					TD = 14.5'			cont advance center Bit beyond 14.5'

Prepared by J Cech Date _____ Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | **CORE SAMPLE LOG**

Borehole ID 00-01244 TA~~OU~~ DC TA-2 Drill Depth From 0.0 To 15.0 Page 1 of 1

Driller S. Johnson Box #(s) — Start Date/Time 9/5/00 1340 End Date/Time 9/5/00 1440

Drilling Equip./Method CME-750/HSA Sampling Equip./Method Cont. Core / Wireline Core Barrel

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0.0	1.5/2.5	CAO2-00-0179 0-1'	βγ= 560 dpm		0.0-7.5 Pale Brown (5YR 5/2) Silty Fine-Med Sand. 20% Silt, 10% Pebbles to 1". Dry Soft loose. (Many of Pebbles are Tuff Fragments). Dry, Soft loose. No bedding.			1340 Running in Wt.
2.5	1.5/2.5	CAO2-00-0180 3-4'	βγ= 600 dpm					
5.0	2.0/2.5		βγ= 550 dpm					
7.5	1.0/2.5		βγ= 550 dpm		7.5-10.25 Moderate Brown 5YR 4/4, Med-Fine silty/Pebbly sand 20% silt, 20% pebbles <0.75". No Bedding moist, Loose.			
10.0	0.25/0.25	—	19 500 dpm		10.25-11.25 No Recovery			10.25-11.25 Center Bit.
	1.25/1.25	CA02-00-0182	βγ= 575 dpm		11.25-12.5 V. Fine-Fine sand. Moderate Brown 5YR 4/4. Well Sorted. <5% silt <5% Pebbles <1.0". No bedding. Soft and Moist.			
12.5	2.0/2.5		βγ= 600 dpm		12.5-15.0 Moderate Brown 5YR 4/4. Coarse sand and cobbles. Cobbles of well indurated Tuff 2-4" (35%) 10-15% Silt. Moist Loose TD=15'			1440: Refusal @ 15.0'
15.0								

Prepared by J Cook Date 9/8/00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 02-01245 TA/OU TA-02- Drill Depth From 0.0 To 15.5 Page 1 of 1

Driller S. Johnson Box #(s) — Start Date/Time 9/11/00, 0950 End Date/Time 9/11/00

Drilling Equip./Method CME-750, HSA Sampling Equip./Method Cont. Core/ Core barrel.

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core In Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
	0.5/2.5		β γ 500 dpm		0.0-5.0' Grayish Brown, 5YR 3/2, Silty Fine-med sand and cobbles. 25% silt, 10% subangular cobbles greater than 3" diam. No Bedding observed. Dry, Soft and Loose. Very Poor recovery.			0950 9/11/00
	0.6/2.5	CA02-00-0290 4'-6'	β γ 500 dpm					
	0.5/1.5		β γ 600 dpm		5.0-6.5' Grayish Brown 5YR 3/2, Fine-Med. Sand and Pebbles. 3% Silt, 12% Subrounded pebbles to 1.25". 3% well indurated Tuff cobbles greater than 3" diam. Moist, Soft Loose with no bedding.			
	X				6.5-7.5 No Rec.			6.5-7.5 No Recovery. Center Bit Through Cobbles.
	1.5/2.5		β γ 550 dpm		7.5-11.5 Grayish Brown 5YR 3/2, Fine-Coarse Sand. 20% Pebbles/gravel, 10% Silt. 5% Subangular Tuff cobbles > 4" in diam. No bedding. Soft Moist and loose.			
	1.0/1.5	CA02-00-0292 10-11.5'	β γ 600 dpm		11.5-13.0 No Rec.			
	X				13.0-14.0 Same as 7.5'-11.5'			11.5-13.0' No Recovery Center Bit Through Cobbles.
	X				14.0-14.5 No Recov.			
	0.5/1.0		β γ 400 dpm		14.5-15.5 Grayish orange-PINK (5YR 7/2) Weathered Tuff. Poorly indurated, non-welded. Pumice to 1.0 cm are not flattened. Moist.			14.0-14.5 No Recovery. Center bit through cobbles.
	0.5/1.0		β γ 550 dpm					

TD = 15.5'

Prepared by J Burch Date 9-11-00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY | **CORE SAMPLE LOG**

Borehole ID 02-01241 TA/OU TA-02 Drill Depth From 0.0 To 37.5' Page 1 of 3

Driller S. Johnson Box #(s) — Start Date/Time 9/11/00, 1215 End Date/Time 9/11/00, 1735

Drilling Equip./Method CME 750 Sampling Equip./Method Core barrel / cont. core

Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
5	1.5/2.5	CA02-00-0300	βγ= 600 dpm		0.0-2.5' Grayish Brown 5YR 3/2 silty fine-medium sand and gravel. 20% silt, 20% subrounded gravel. Cobbles > 4". No bedding. Dry, soft, v. Loose.			Depths are slanted Feet in a 45° angle hole.
	0.0/2.5	—	—		2.5-7.5 No Recovery.			
	0.0/2.5	—	—		7.5-10.0 Grayish Brown 5YR 3/2 Silty fine sand and gravel. 15% silt 20% subrounded gravel clasts to 1.5". Moist, soft and loose.			
5	1.5/2.5	CA02-00-0301 7.5-9.0'	βγ= 700 dpm		10.0-12.5 Grayish Brown 5YR 3/2 Coarse to medium gr. sand. 12% sub-rounded pebbles to 1.0". 5% silt Moist, soft, loose with no Bedding.			Add catcher to Bottom of core Barrel.
	2.5/2.5	—	βγ= 650 dpm		12.5-17.5 Pale Brown 5YR 5/2 M-coarse sand and gravel/cobbles. gravel + cobbles 30% >4" diam. are subangular to subrounded. (30% gravel 10% cobbles). Slightly moist to v. moist at 17.5'. Loose w/ no bedding.			
	1.0/2.5	—	βγ= 600 dpm					

Prepared by J Lynch Date 9/11/00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 02-01246 TA/OU TA-02 Drill Depth From 0.0 To 37.5 Page 2 of 3

Driller S. Johnson Box #(s) ~ Start Date/Time 9/11/00, 1215 End Date/Time 9/11/00, 1735

Drilling Equip./Method CME 750/HSA Sampling Equip./Method Core Barrel / Cont. Core

Depth (feet)	Recovery (feet per feet / %)	Field Anaytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
5	1.5/2.5		—		17.5-20' Same as Above. Very Moist.			
	1.5/2.5	CA02-00-0302 17.5-19.5	βγ= 520 dpm		20.0-27.5 Grayish Brown 5YR 3/2 Fine-medium sand and gravel. Grades To coarse sandy cobbles. Tuff cobbles >4". Gravel is sub angular. No bedding. v. moist. Loose.			
	1.5/2.5		βγ 580 dpm					25' augers may have started to kick off about this depth. Probably kicking up going through cobbles.
5	2.0/2.5		βγ 480 dpm		27.5-35.0 Grayish Brown 5YR 3/2 coarse sand and gravel. 40% sub-angular gravel and cobbles of gray well indurated tuff >4" diam. V. moist and loose. Wet starting at ~34 (1' above contact.).			
	1.5/2.5		βγ= 550 dpm					
	2.0/2.5		βγ 650 dpm					

Prepared by [signature] Date 9-11-00 Checked By _____ Date _____

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROGRAM

SAMPLE MANAGEMENT FACILITY

CORE SAMPLE LOG

Borehole ID 02-01246 TA/OU TA-02 Drill Depth From 0.0 To 37.5' Page 3 of 3

Driller S. Johnson Box #(s) — Start Date/Time 9/11/00, 1215 End Date/Time 9/11/00, 1735

Drilling Equip./Method CME 750 / HSA Sampling Equip./Method Geo. Barrel / Cont. Core

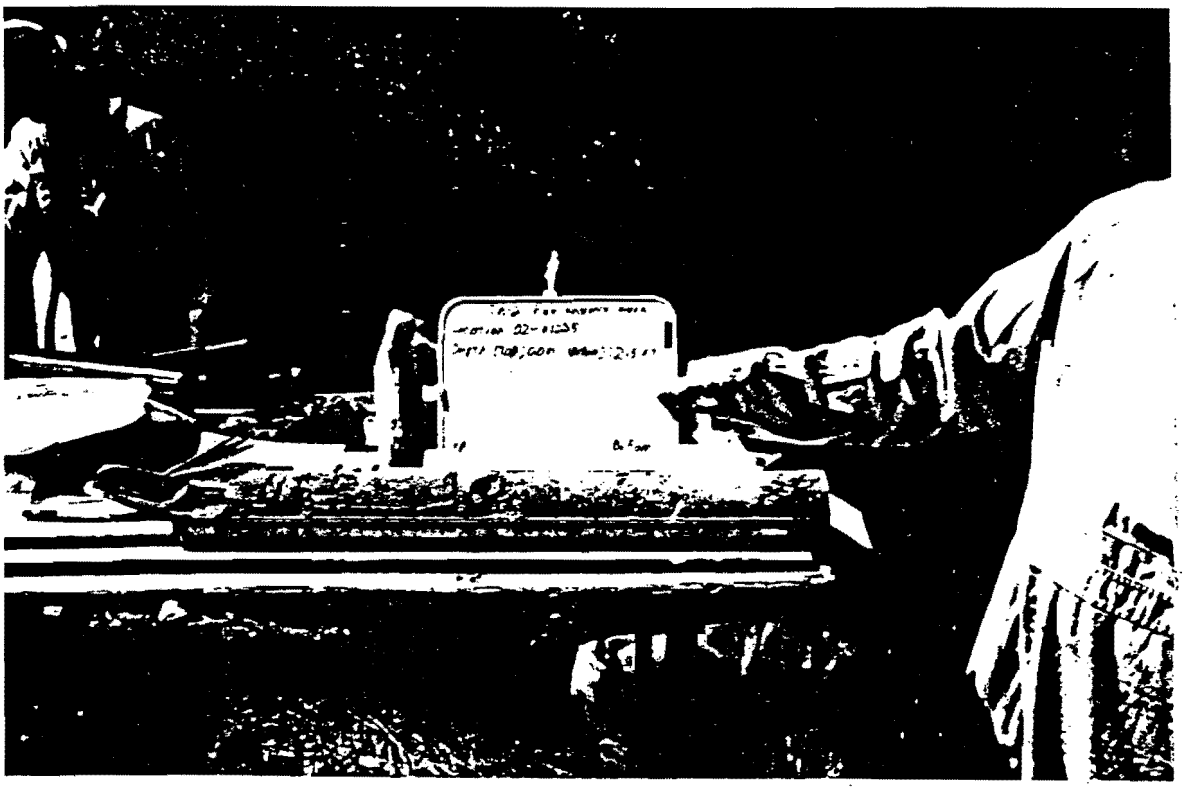
Depth (feet)	Recovery (feet per feet / %)	Field Analytical Sample Number	Field Screening Results	Top/Bottom of Core in Box	Lithology-Petrology - Soil	Graphic Log	Lithologic Unit	Notes
0	2.0/2.5		BG = 500 dpm		35.0-37.5 Grayish orange-Pink 5YR 7/2 Tuff. Weathered. Non-welded and moderately indurated. Pumice are not flattened. Note: No clay layer @ contact with beds above. Weathered Tuff is just not very permeable.			
2.5	2.0/2.5	0202-00-0303	BG 550 dpm					
5.0	2.5/2.5	0202-00-0304	BG 520 dpm		TD=37.5'			
7.5								

Prepared by Q Cuff Date 9/11/00 Checked By _____ Date _____

APPENDIX B

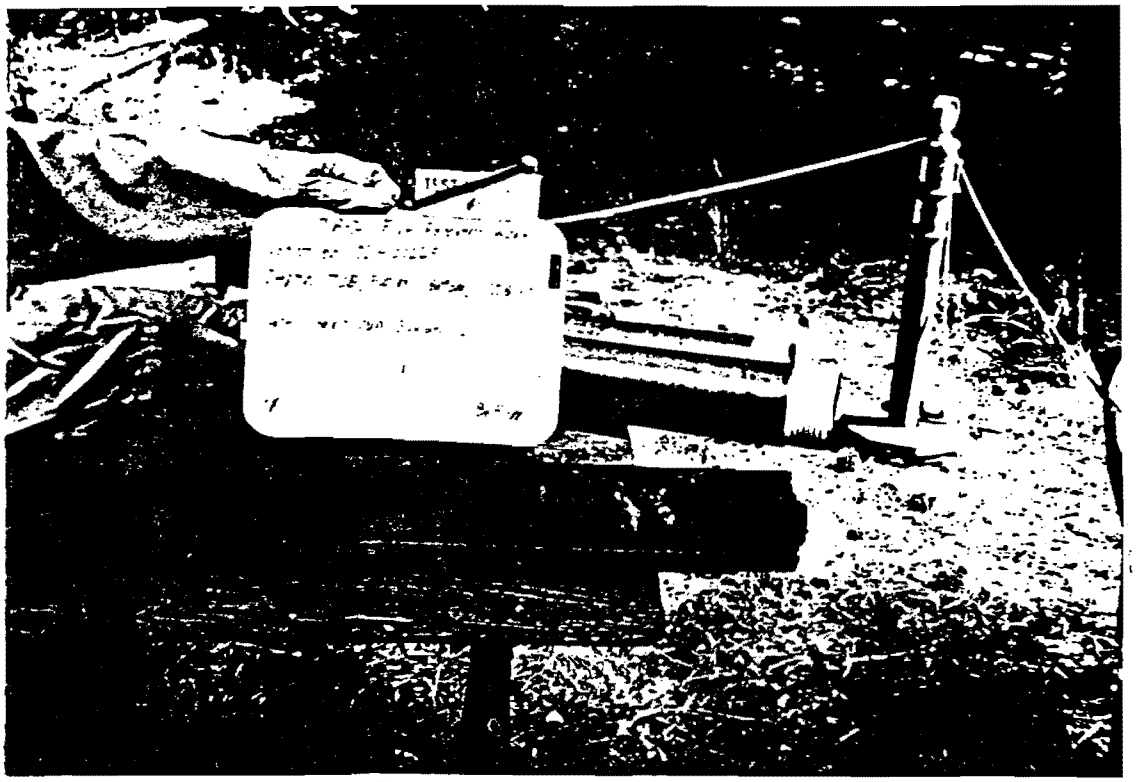
PHOTOGRAPHS OF SITE ACTIVITIES

PRS 02- 009 (c)
Top: 0 Bottom: 2.5'



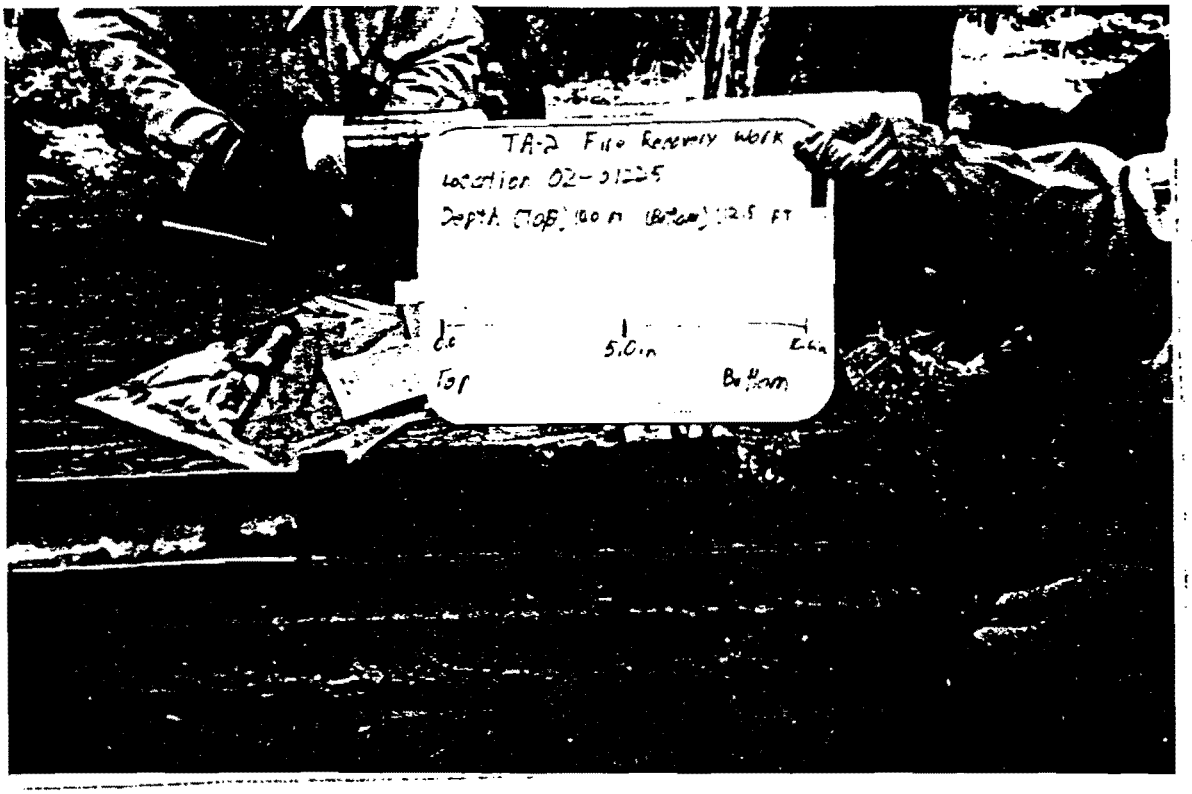
Location 02- 01225
PRS 02- 009(c)
Top: 2.5' Bottom: 4.5'

PRS 02- 009(c)
Top: 5.0' Bottom: 7.5'



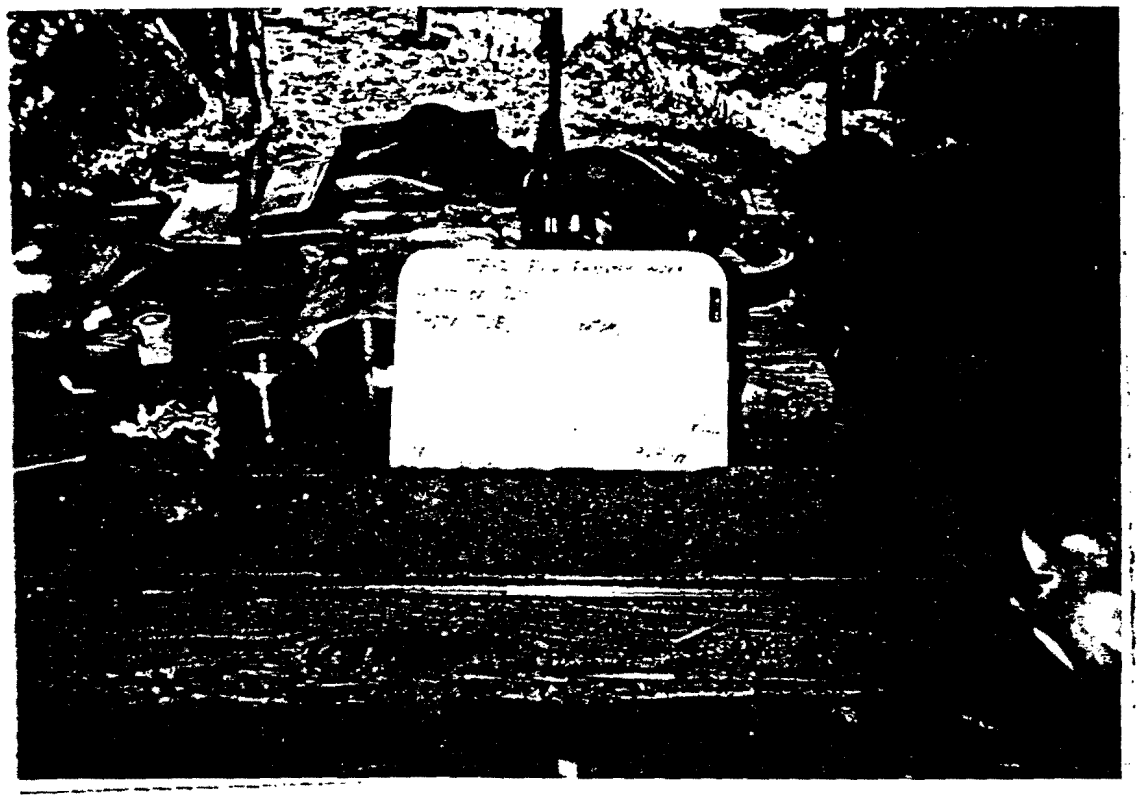
Location 02- 01225
PRS 02- 009(c)
Top: 8.0' Bottom: 10.0'

Top: 10.0' Bottom: 12.5'

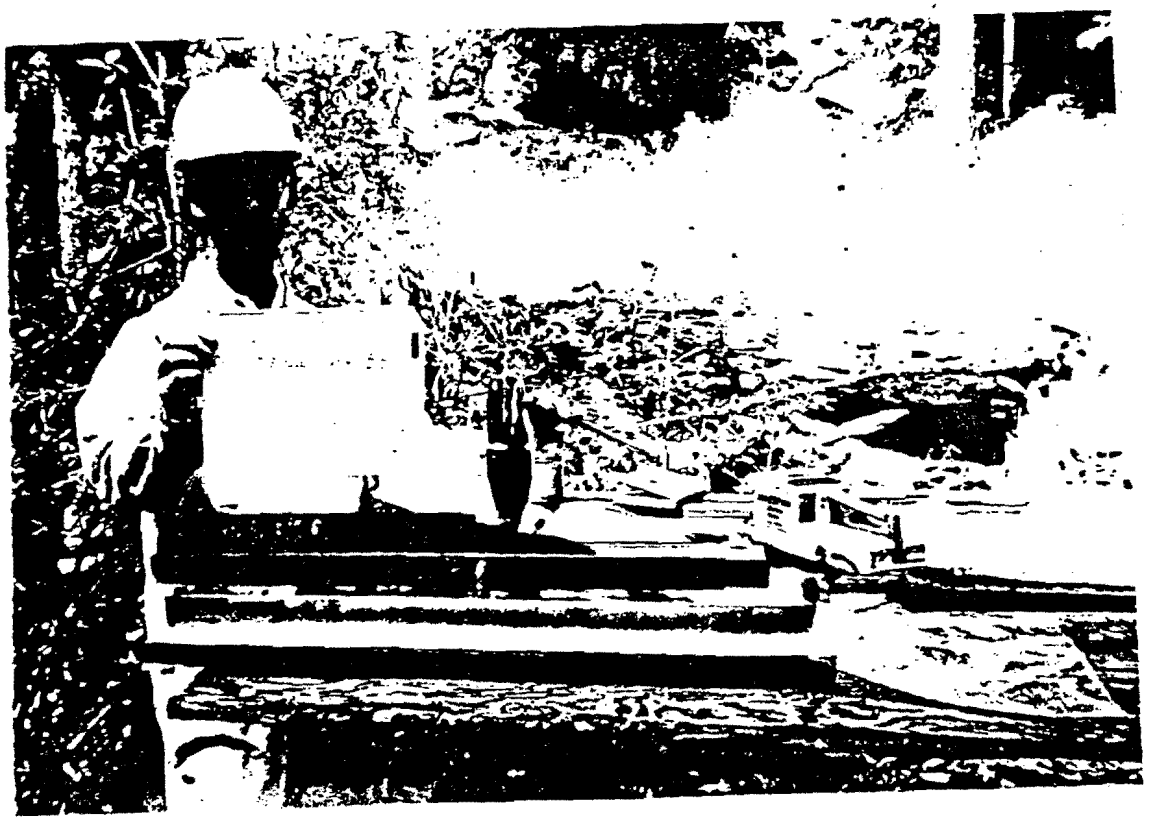


Location 02- 01225
PRS 02- 009(c)
Top: 12.5' Bottom: 15.0'

PRS 02- 009(c)
Top: 0.0 Bottom: 2.0'

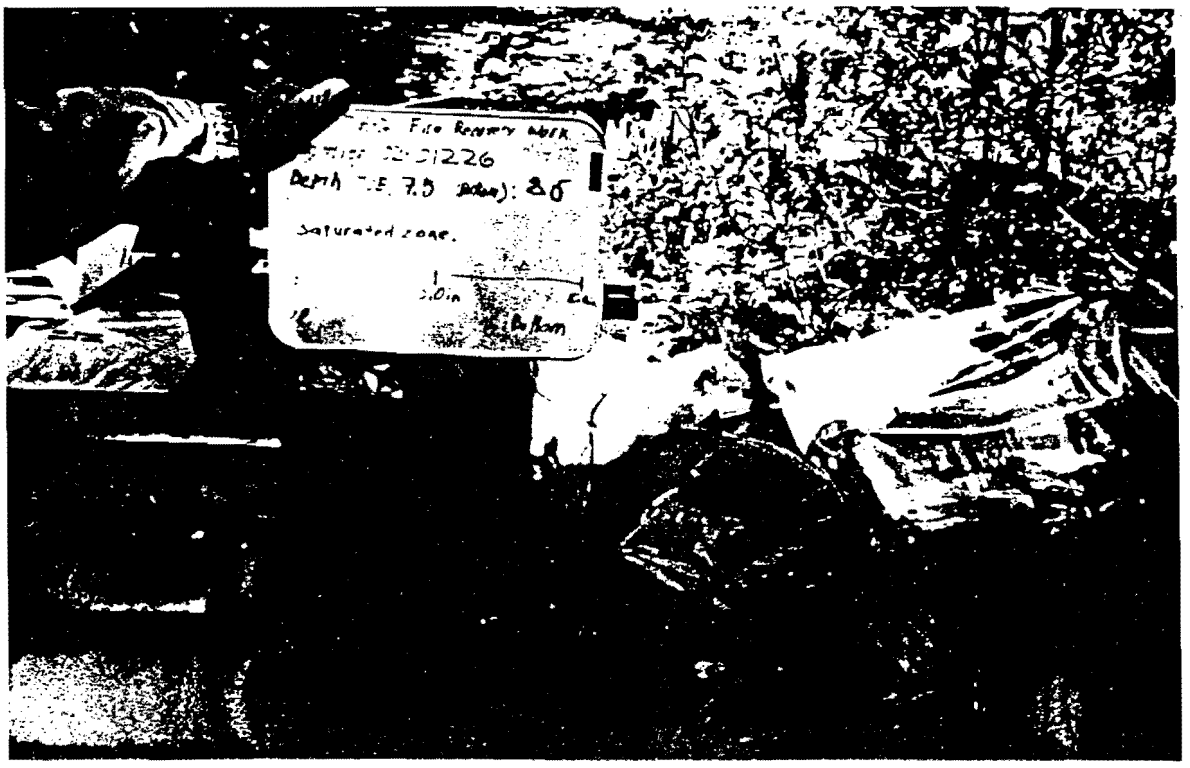


Location 02- 01226
PRS 02- 009(c)
Top: 5.0' Bottom: 5.5'

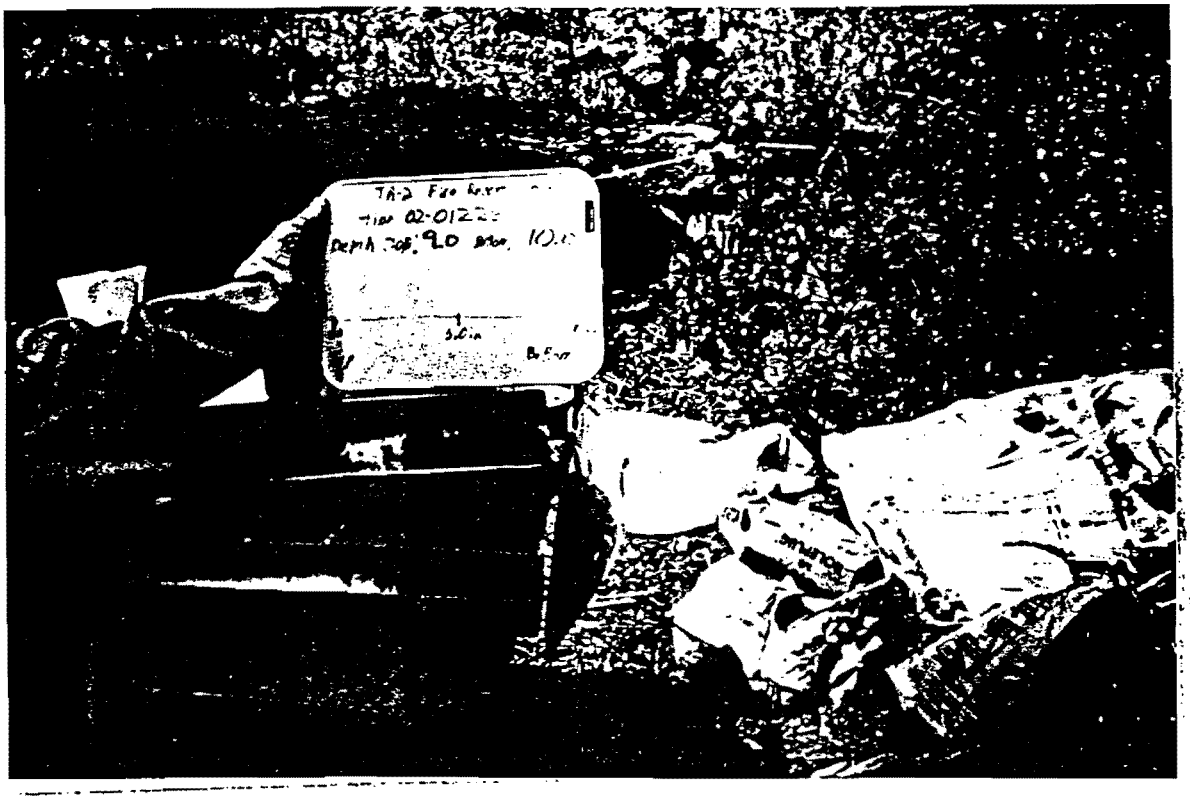


Location 02- 01226
PRS 02- 009(c)
Top: 5.5' Bottom: 7.5'

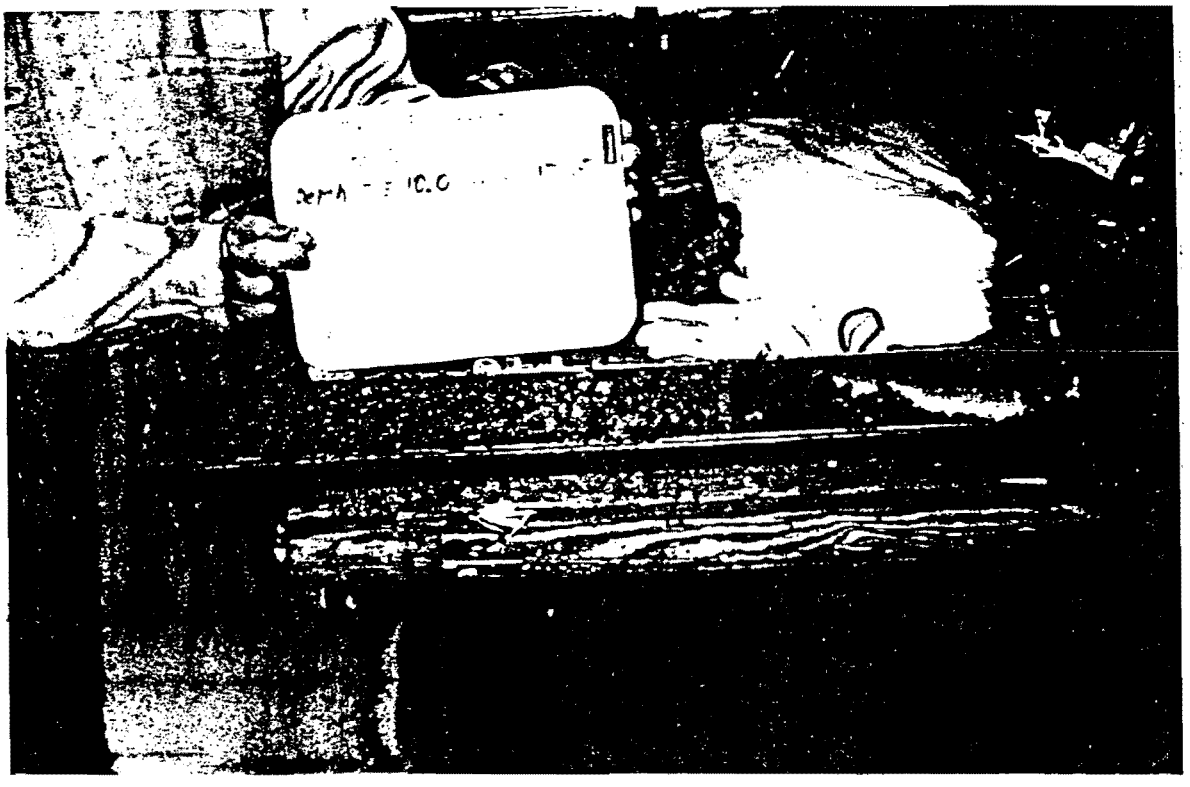
Location 02- 01226
PRS 02- 009(c)
Top: 7.5' Bottom: 8.5'



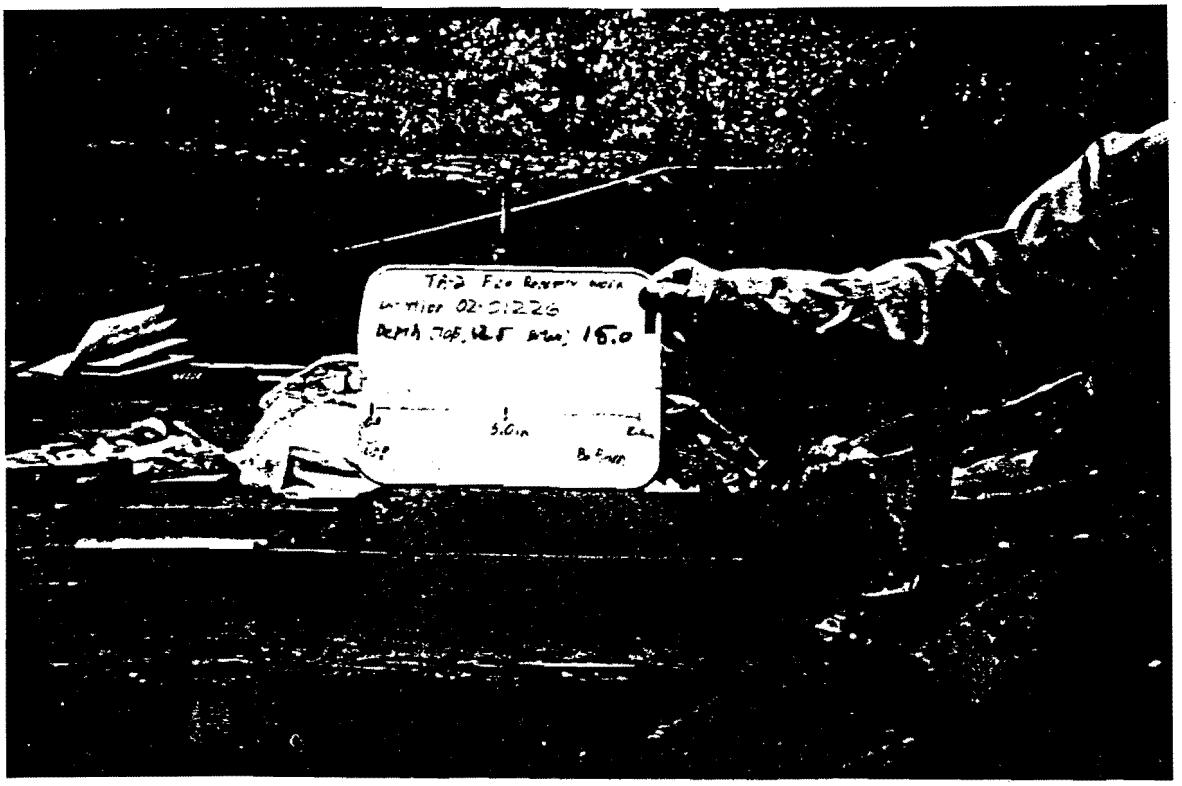
Location 02- 01226
PRS 02- 009(c)
Top: 9.0' Bottom: 10.0'



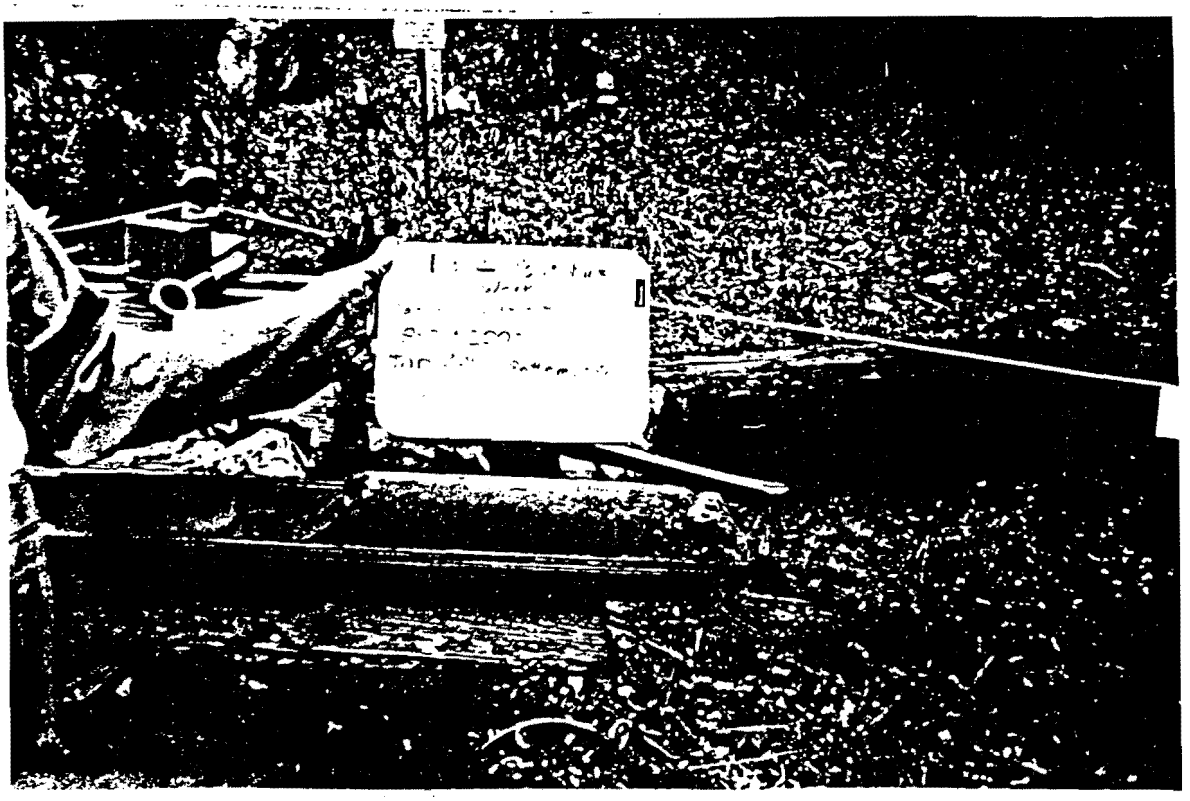
Location 02- 01226
PRS 02- 009(c)
Top: 10.0' Bottom: 12.5'



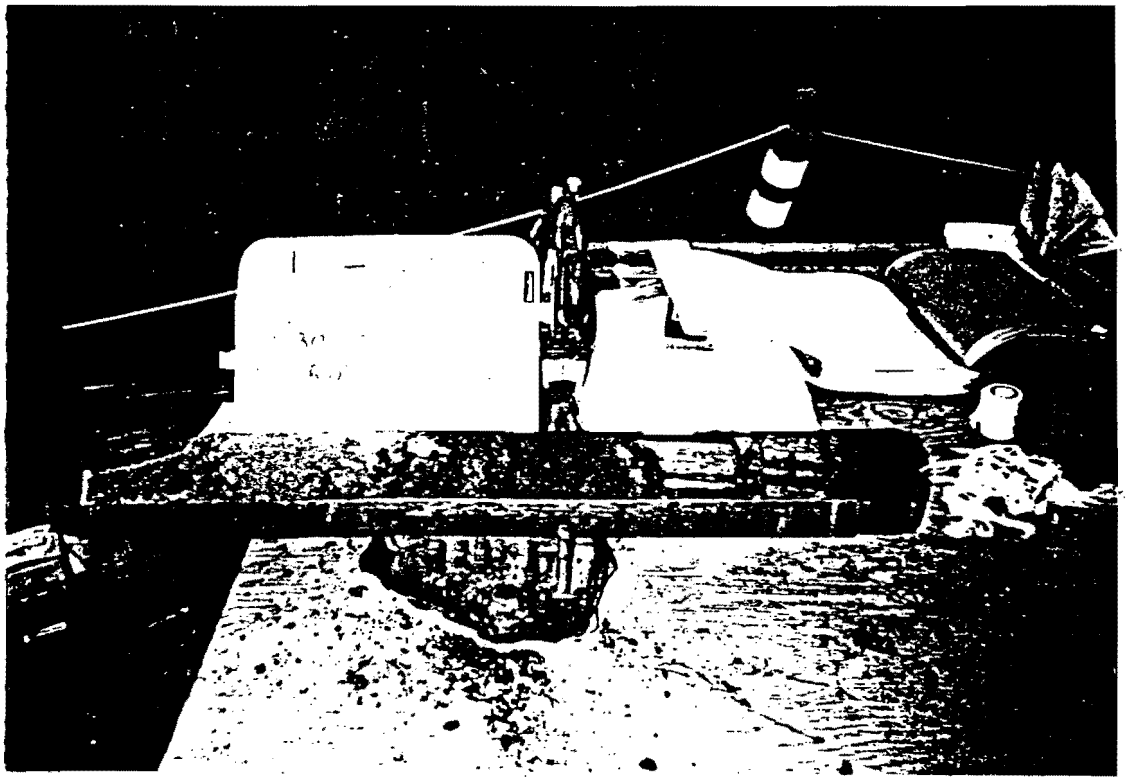
PRS 02- 009(c)
Top: 12.5' Bottom: 15.0'



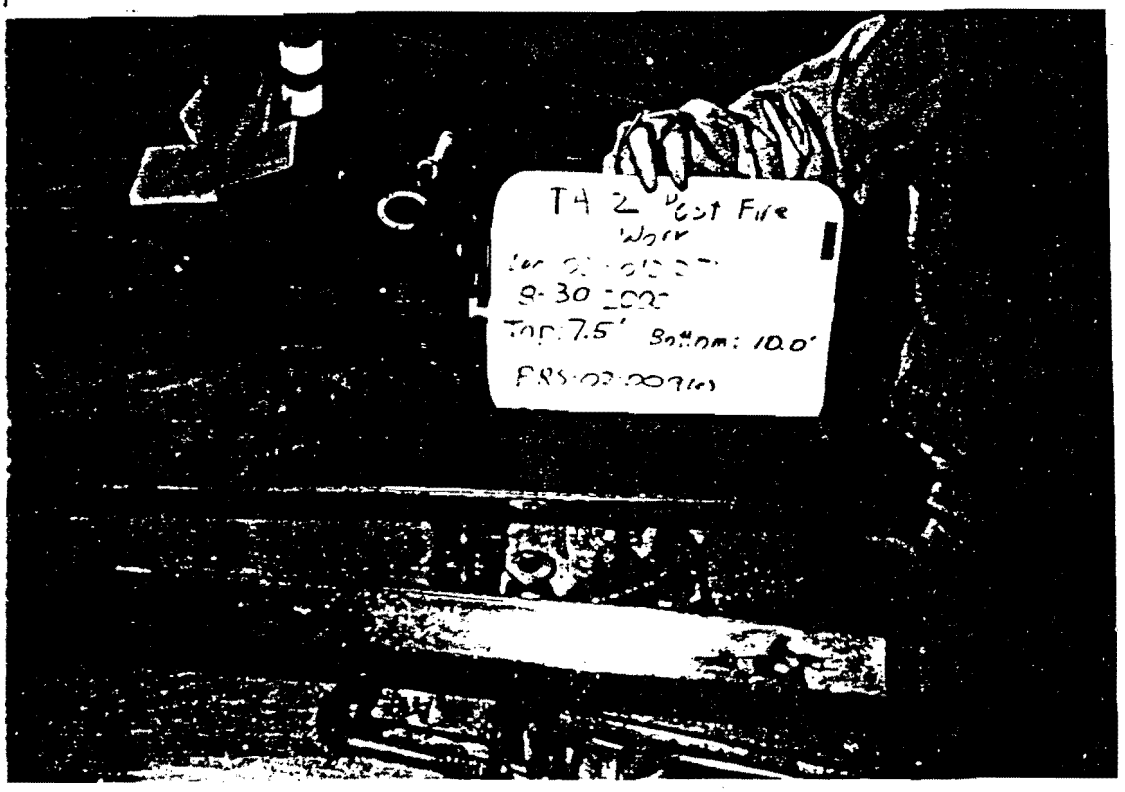
Location 02- 01227
PRS 02- 009(c)
Top: 2.5' Bottom: 5.0



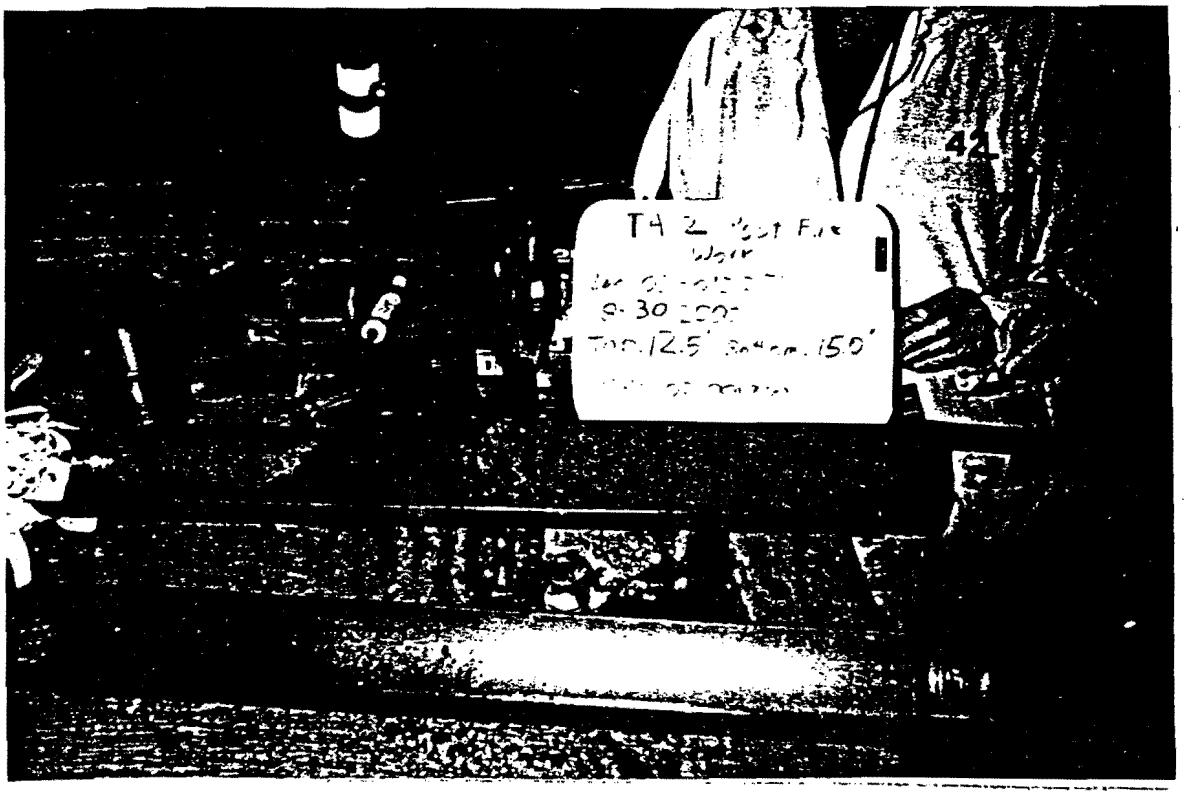
PRS 02- 009(c)
Top: 5.0' Bottom: 7.5'



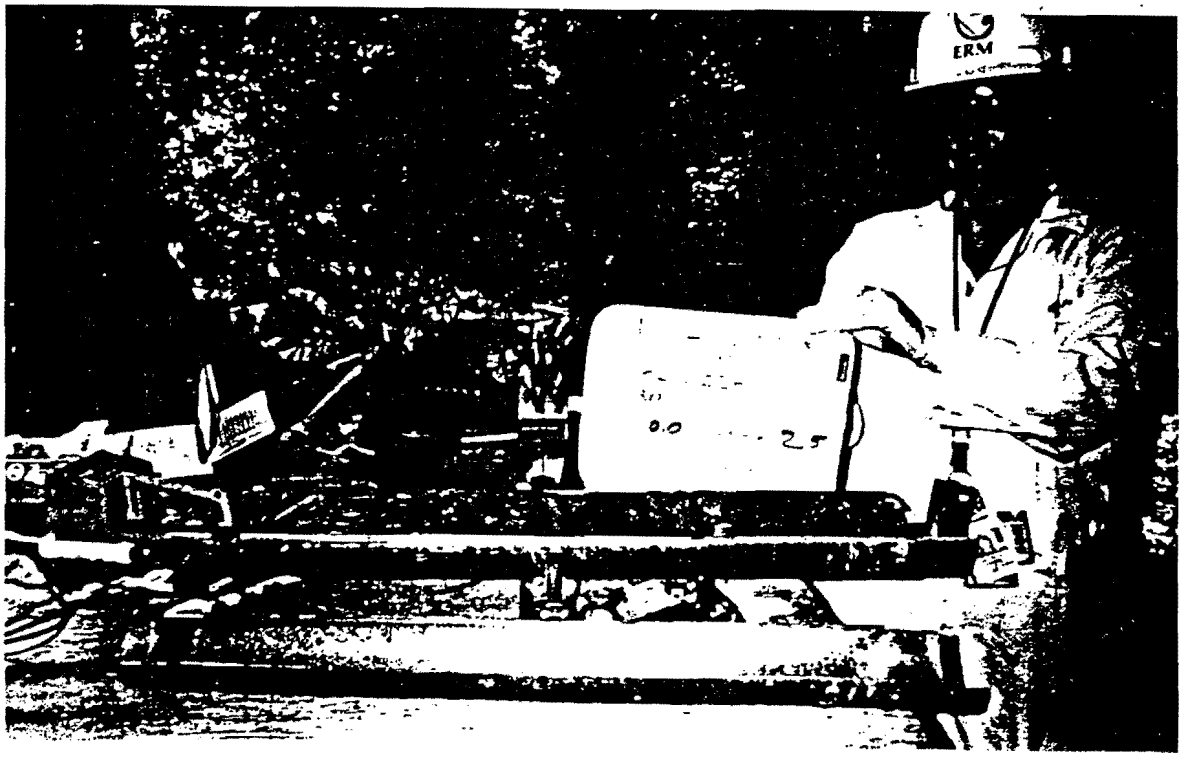
Location 02- 01227
PRS 02- 009(c)
Top: 7.5' Bottom: 10.0'



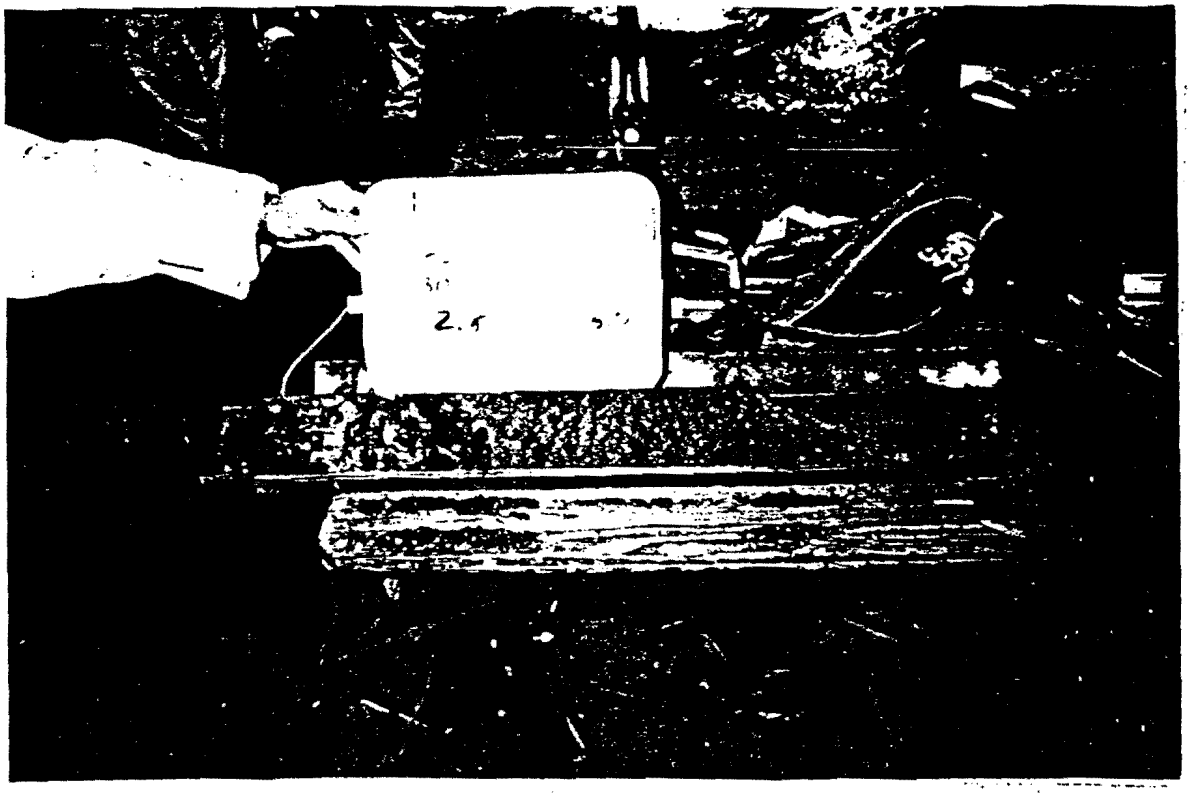
Location 02- 01227
PRS 02- 009(c)
Top: 12.5' Bottom: 15.0'



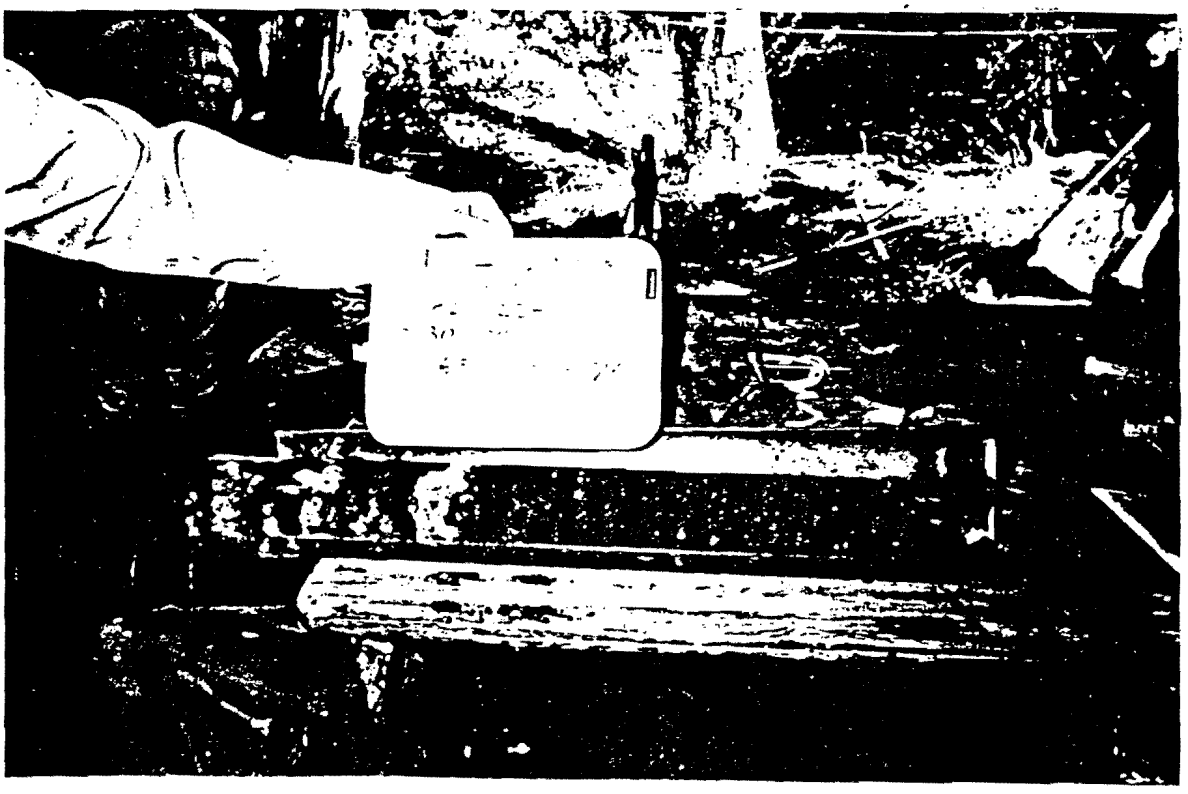
Location 02- 01228
PRS 02- 009(c)
Top: 0.0 Bottom: 2.5'



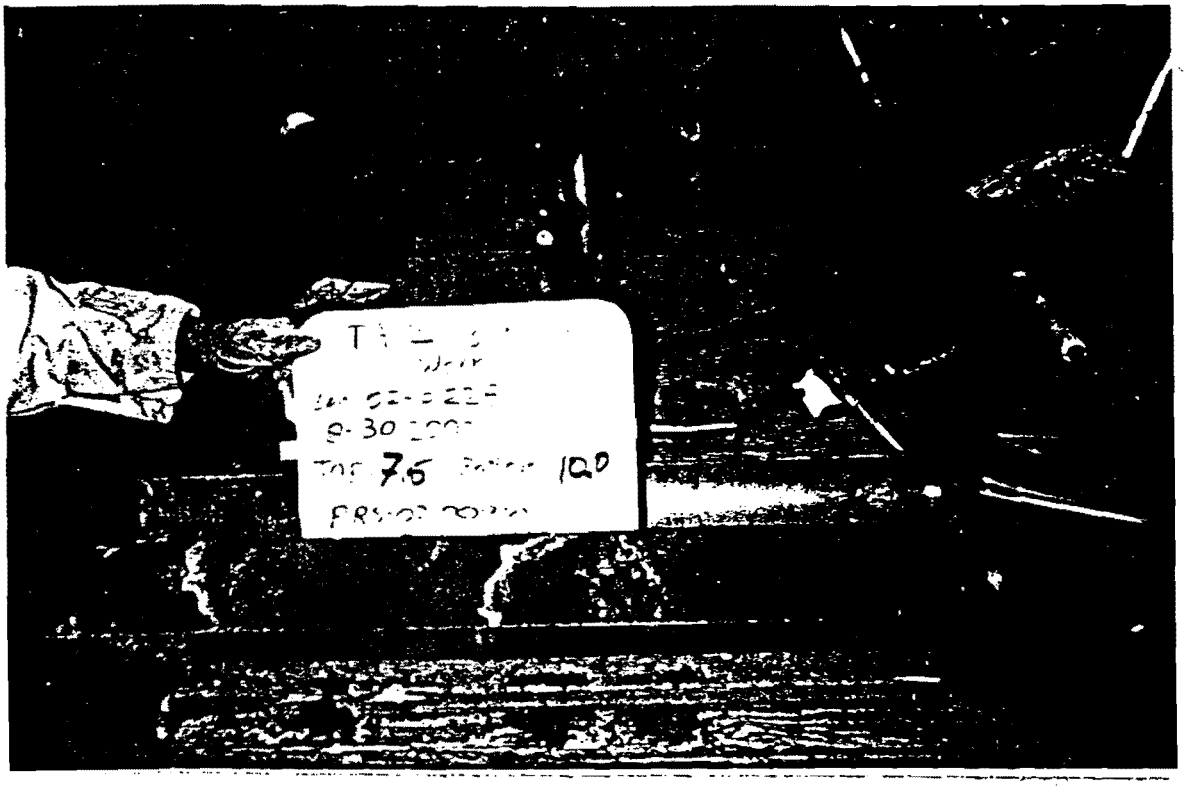
PRS 02- 009(c)
Top: 2.5' Bottom: 5.0'



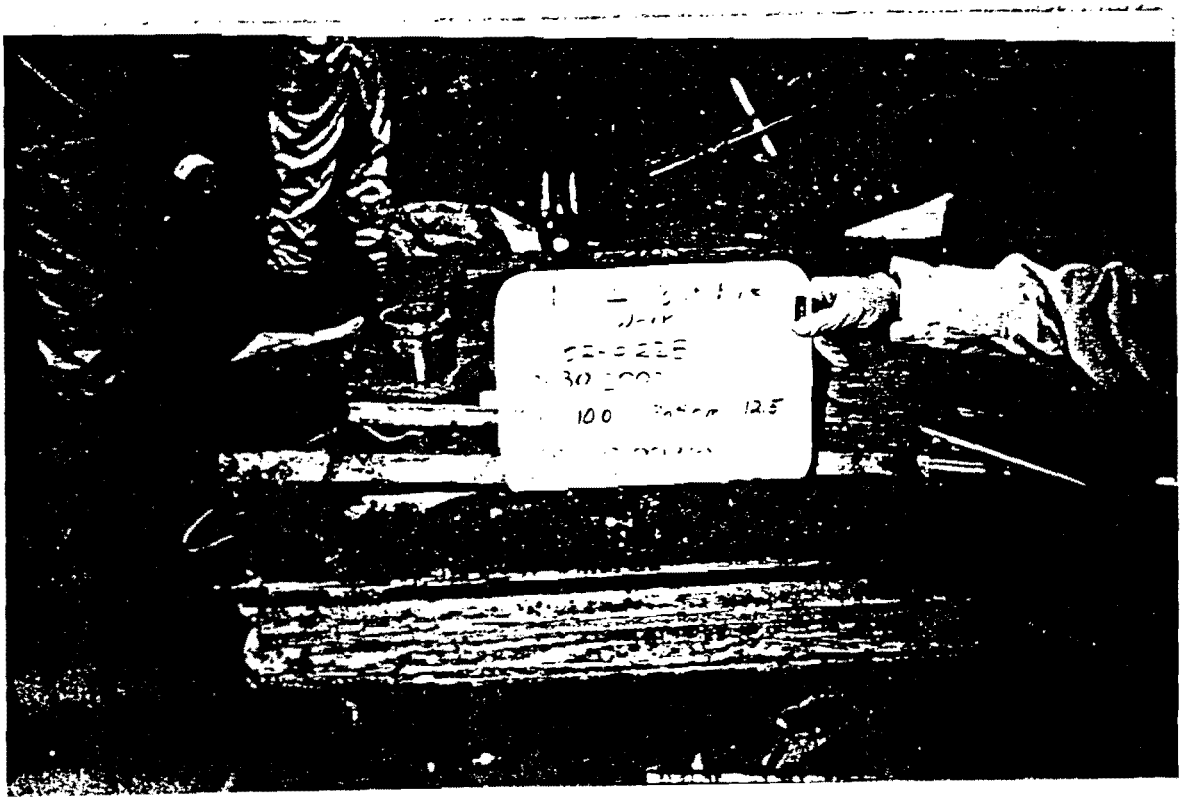
Location 02- 01228
PRS 02- 009(c)
Top: 5.5' Bottom: 7.5'



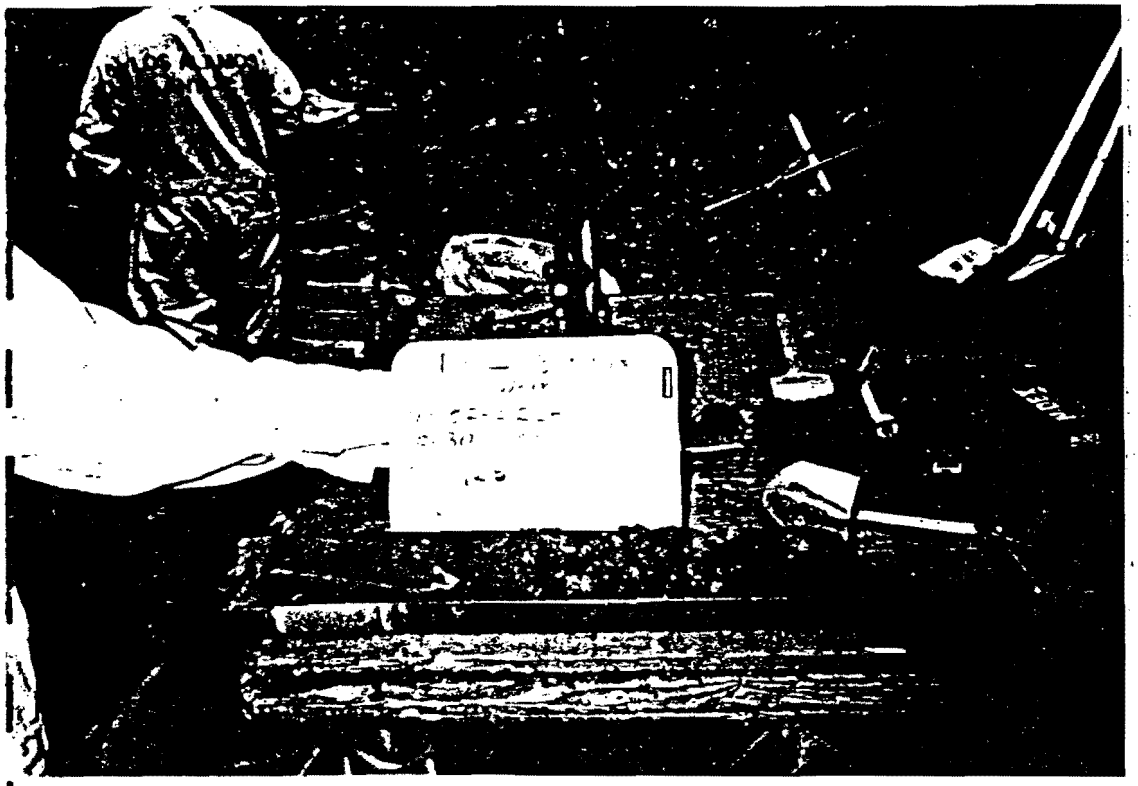
PRS 02- 009(c)
Top: 7.5' Bottom: 10.0'



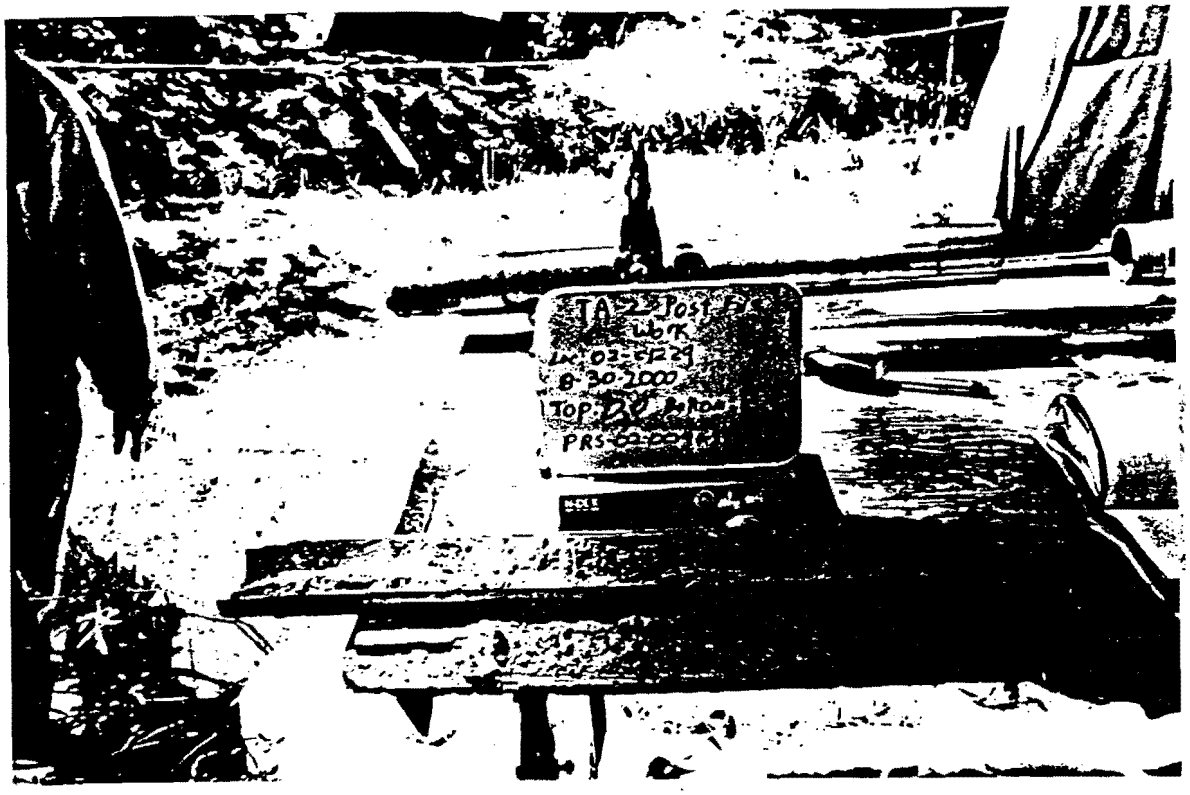
Location 02- 01228
PRS 02- 009(c)
Top: 10.0' Bottom: 12.5'



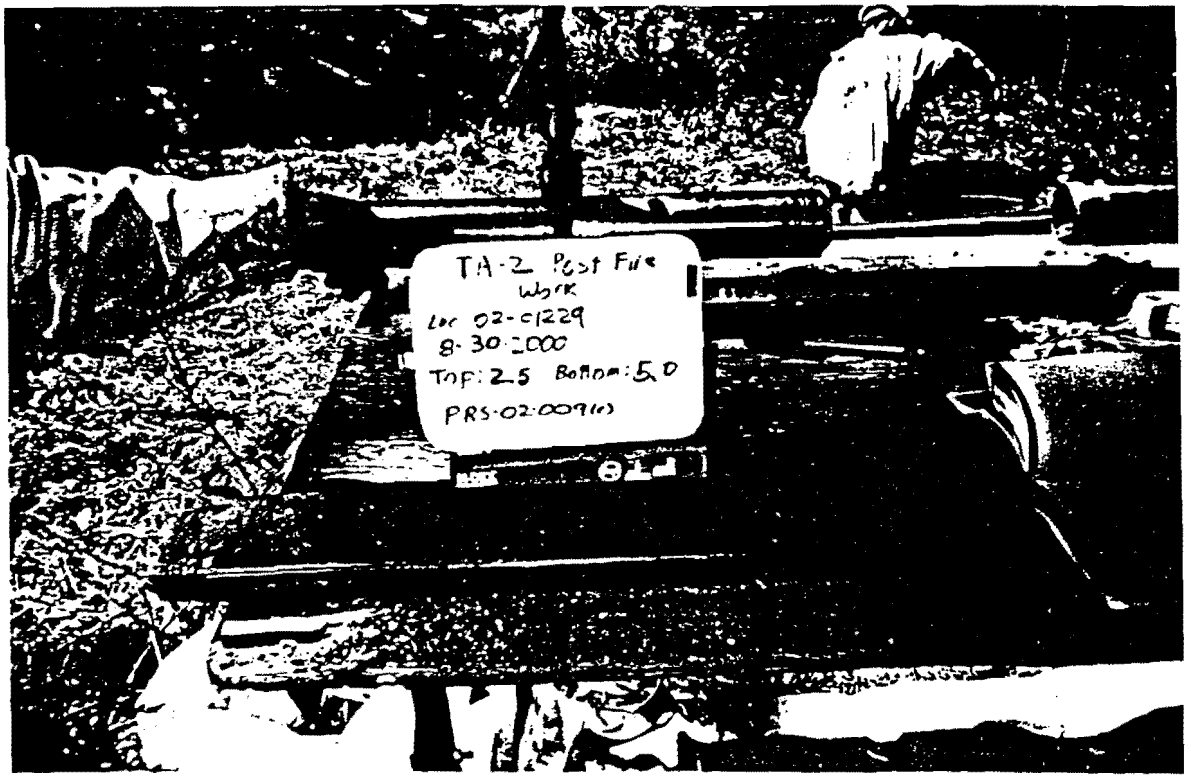
PRS 02- 009(c)
Top: 12.5' Bottom: 15.0'



PRS 02- 009(c)
Top: 0.0 Bottom: 2.5'

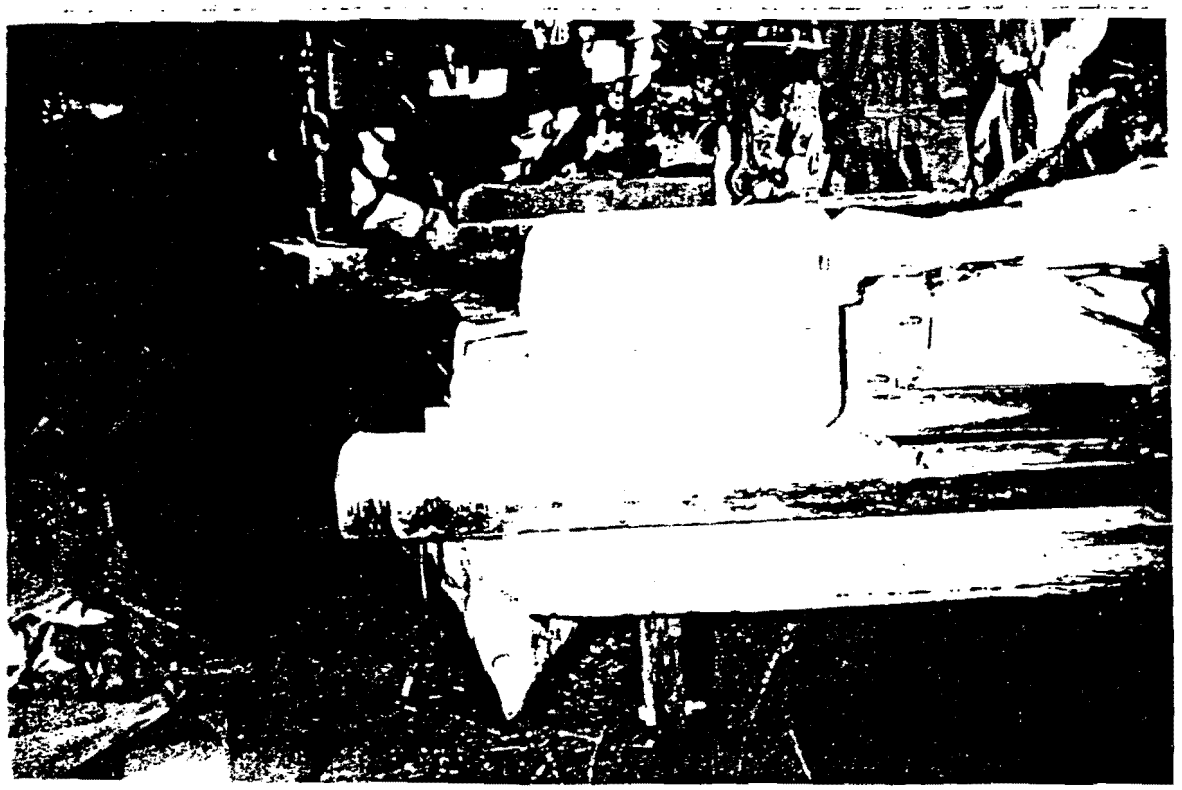


Location 02- 01229
PRS 02- 009(c)
Top: 2.5' Bottom: 5.0'



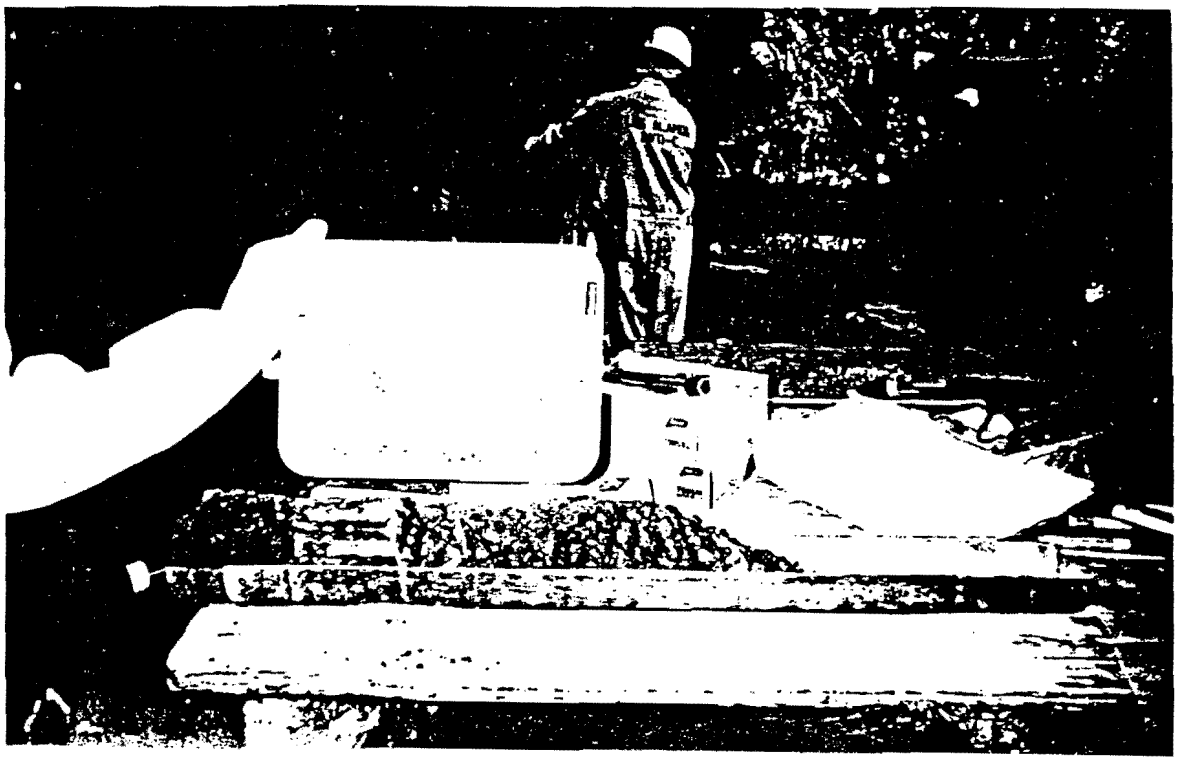
PRS 02- 009(c)
Top: 5.0' Bottom: 7.5'

Location 02- 01230
PRS 02- 009(c)
Top: 0.0 Bottom: 2.5'

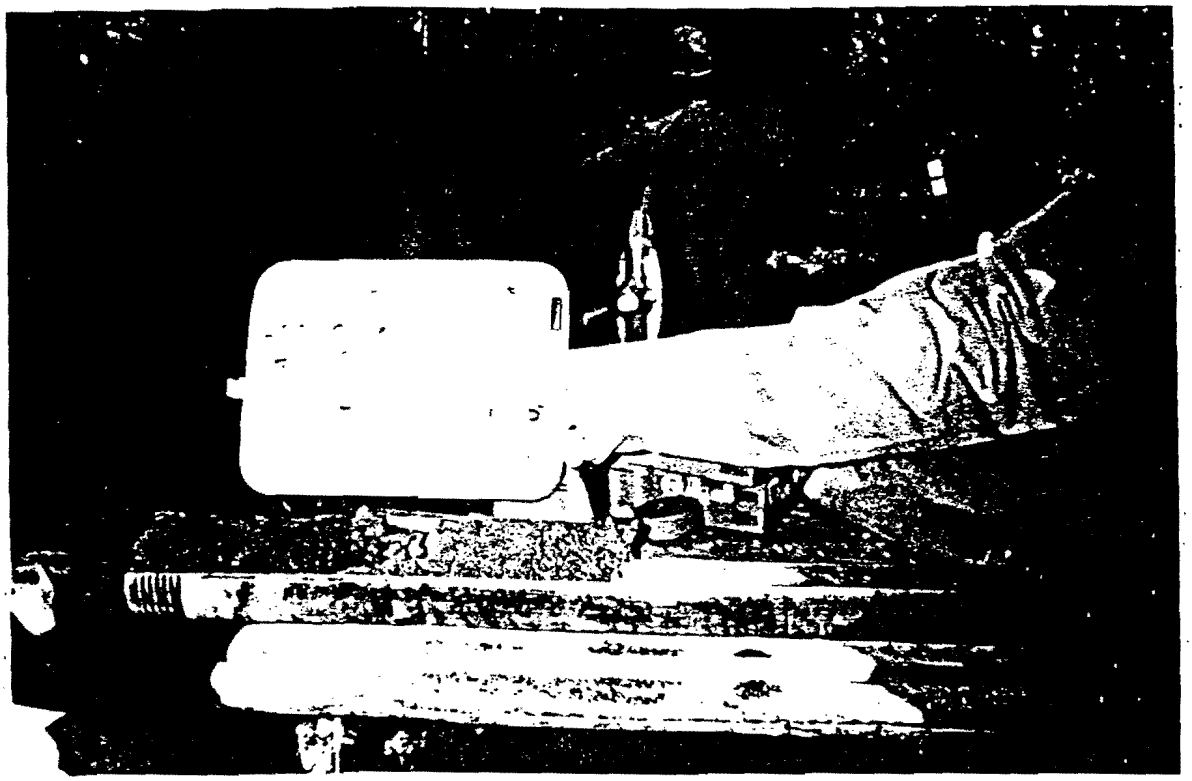


PRS 02- 009(c)
Top: 5.0' Bottom: 7.5'

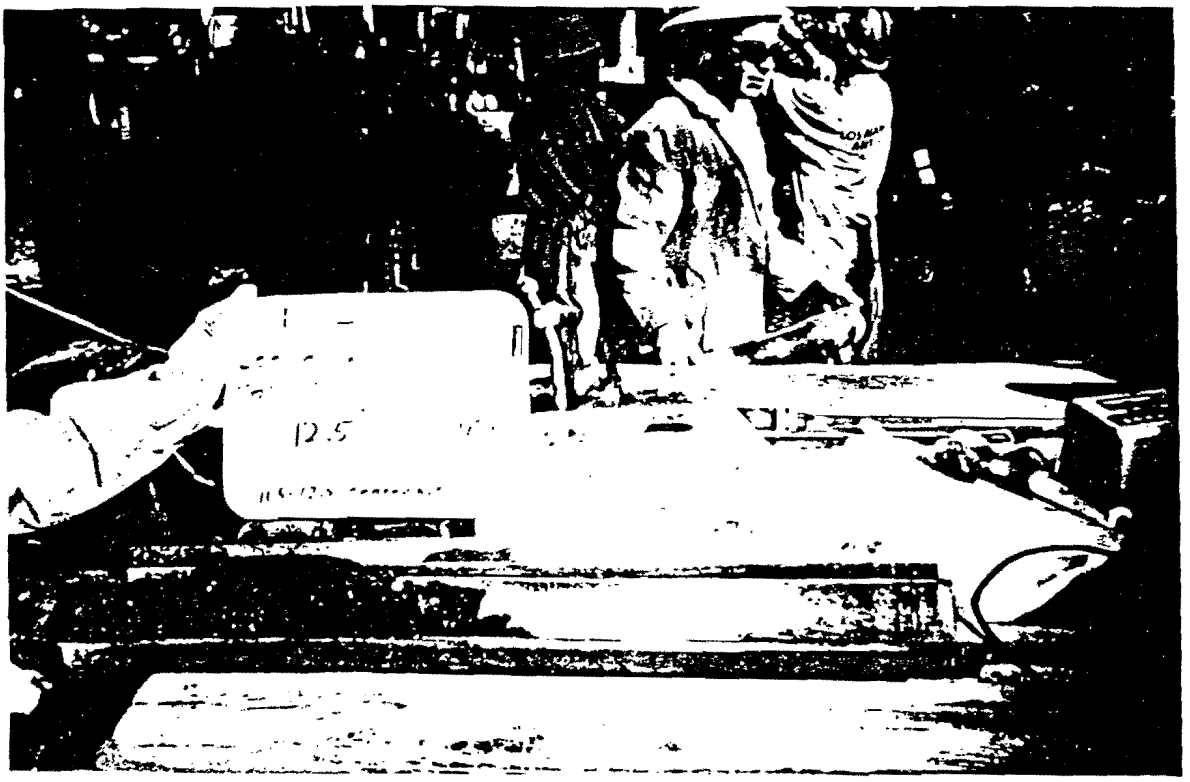
Location 02- 01230
PRS 02- 009(c)
Top: 8.0' Bottom: 10.0'



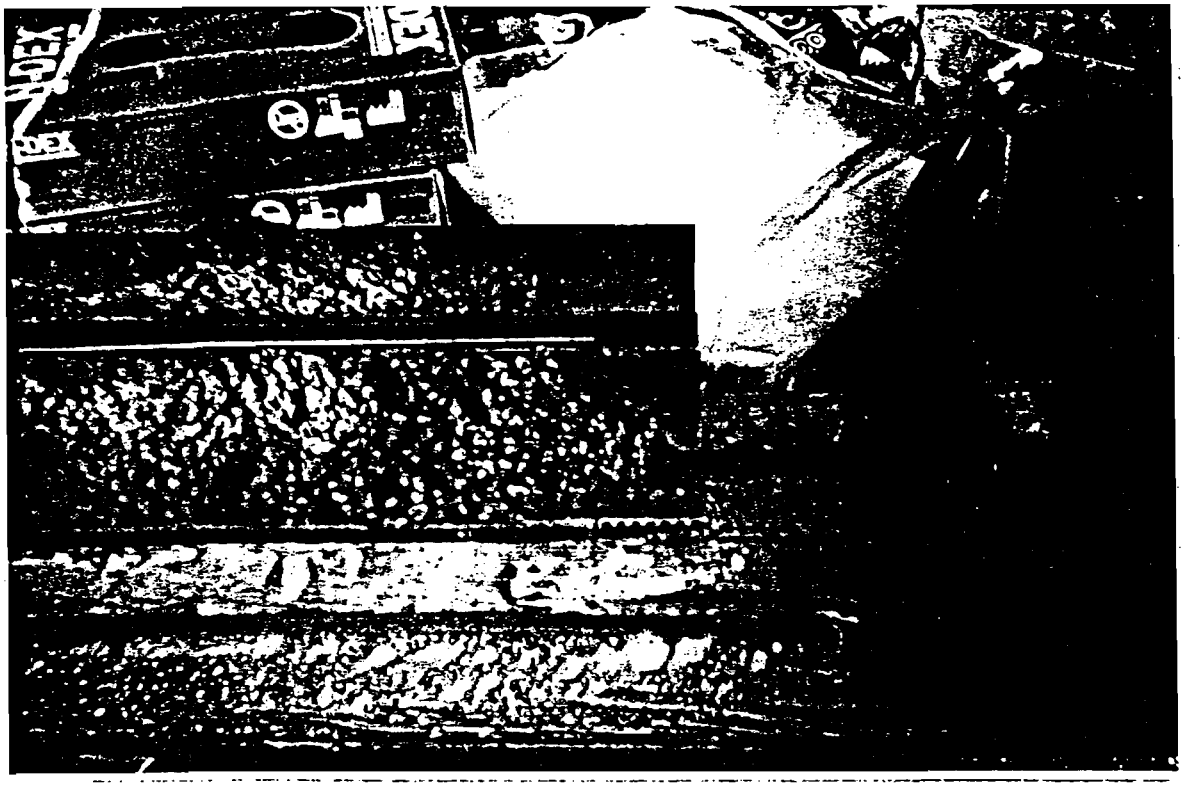
PRS 02- 009(c)
Top: 10.0' Bottom: 11.5'



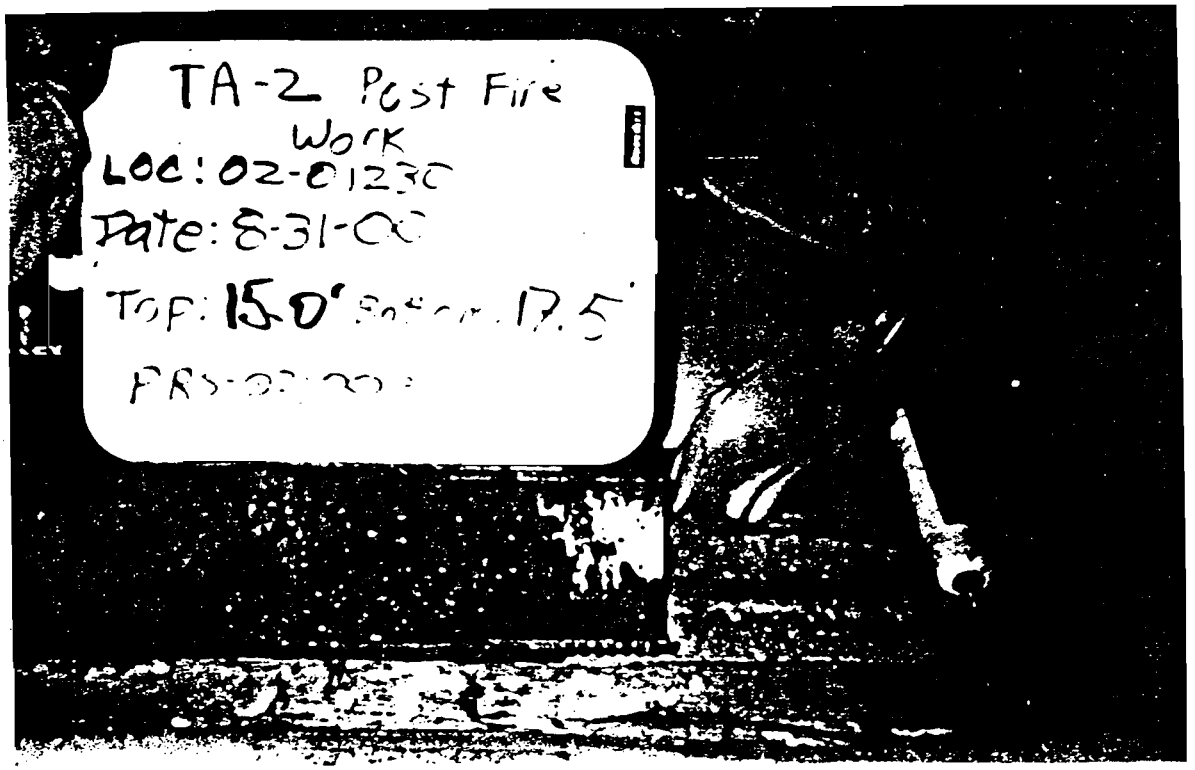
Location 02- 01230
PRS 02- 009(c)
Top: 12.5' Bottom: 15.0'



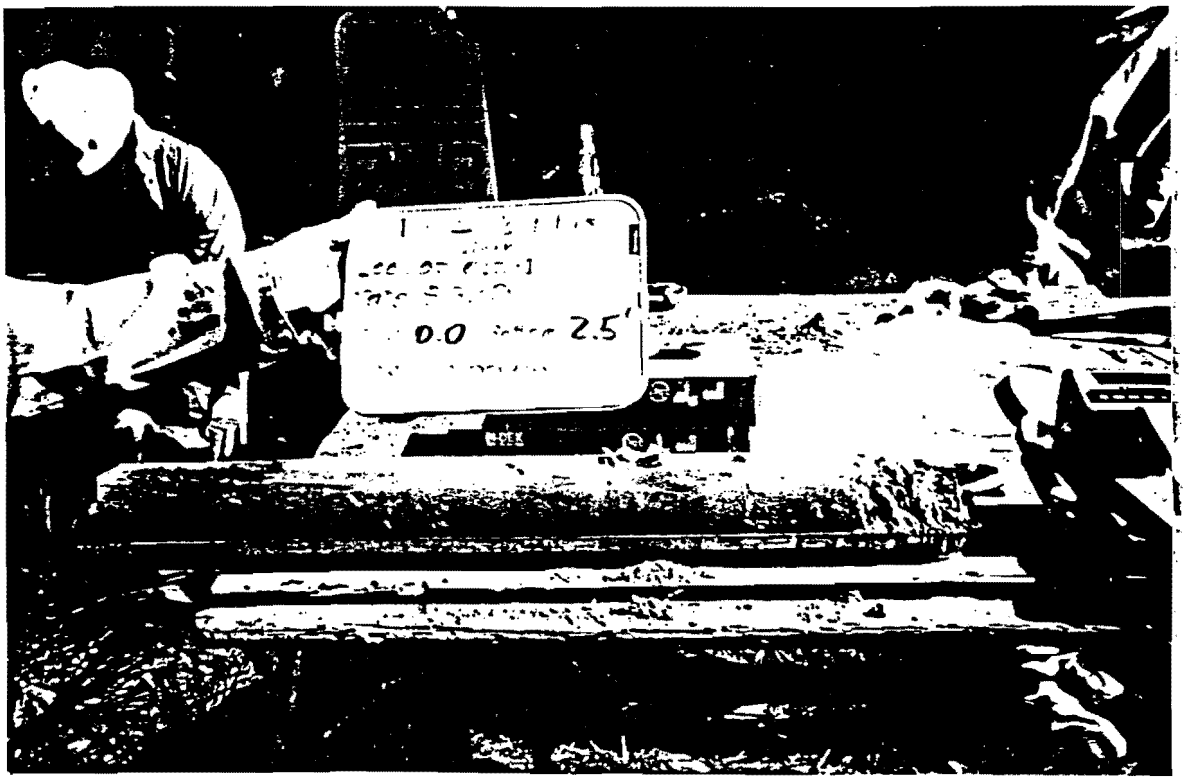
PRS 02- 009(c)
Top: 15.0' Bottom: 17.5'



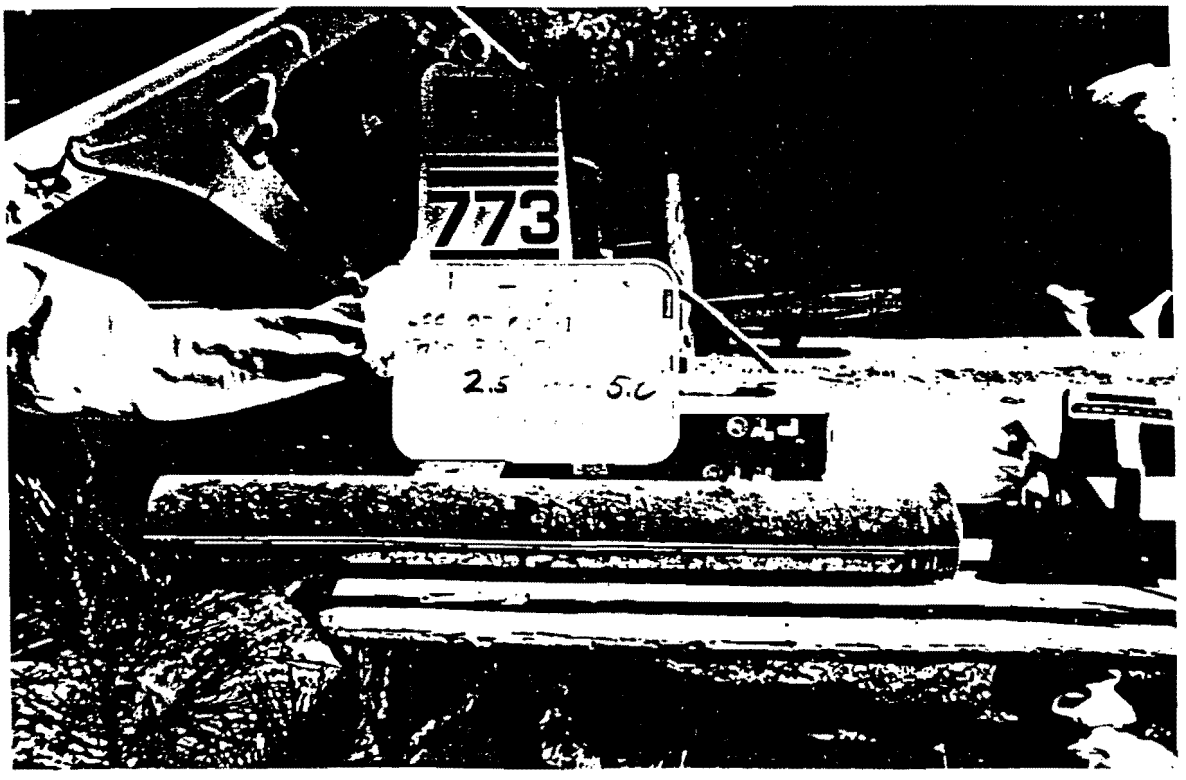
Location 02- 01230
PRS 02- 009(c)
Top: 15.0' Bottom: 17.5'



Location 02- 01231
PRS 02- 009(c)
Top: 0.0 Bottom: 2.5'



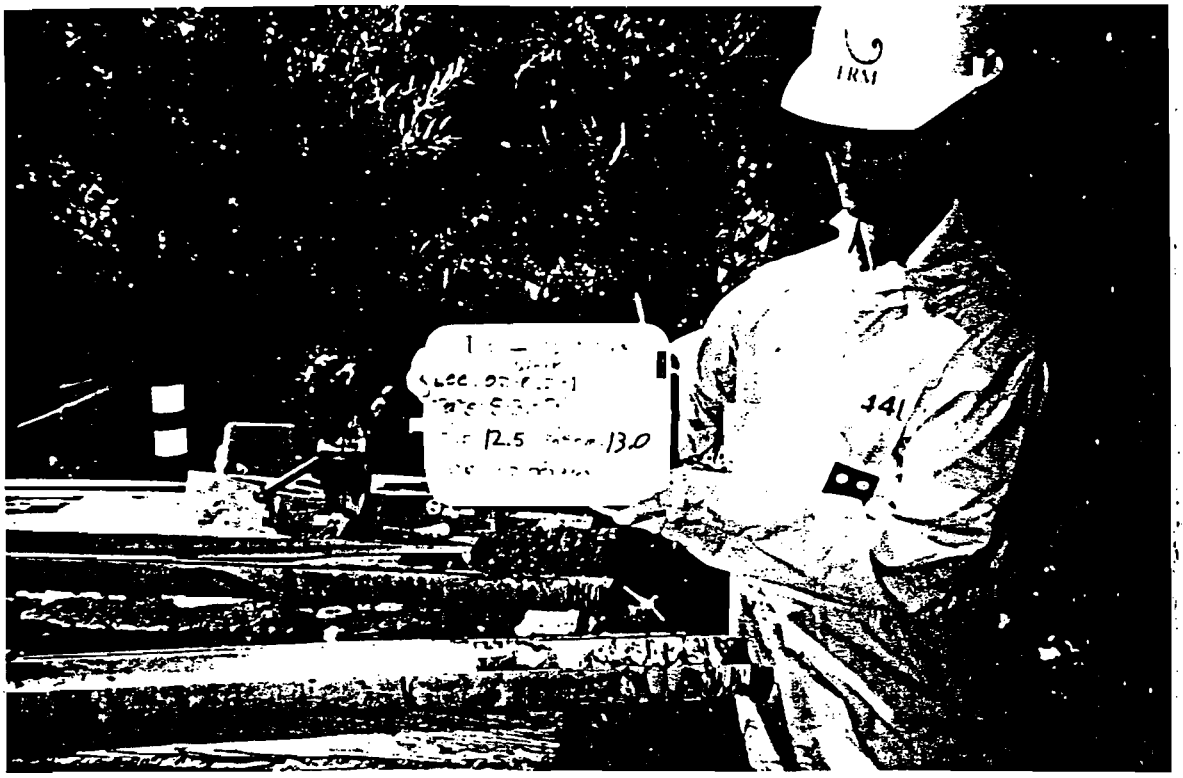
Location 02- 01231
PRS 02- 009(c)
Top: 2.5' Bottom: 5.0'



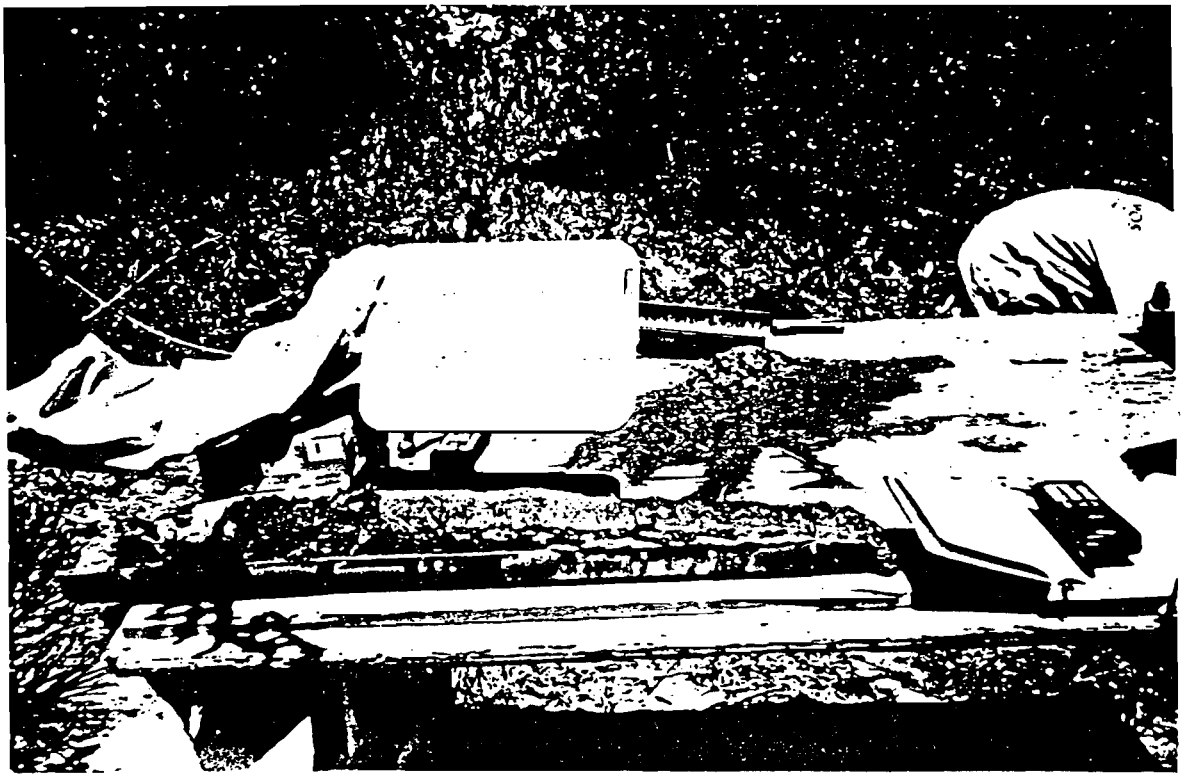
PRS 02- 009(c)
Top: 7.5' Bottom: 10.0'

Location 02- 01231
PRS 02- 009(c)
Top: 10.0' Bottom: 12.5'

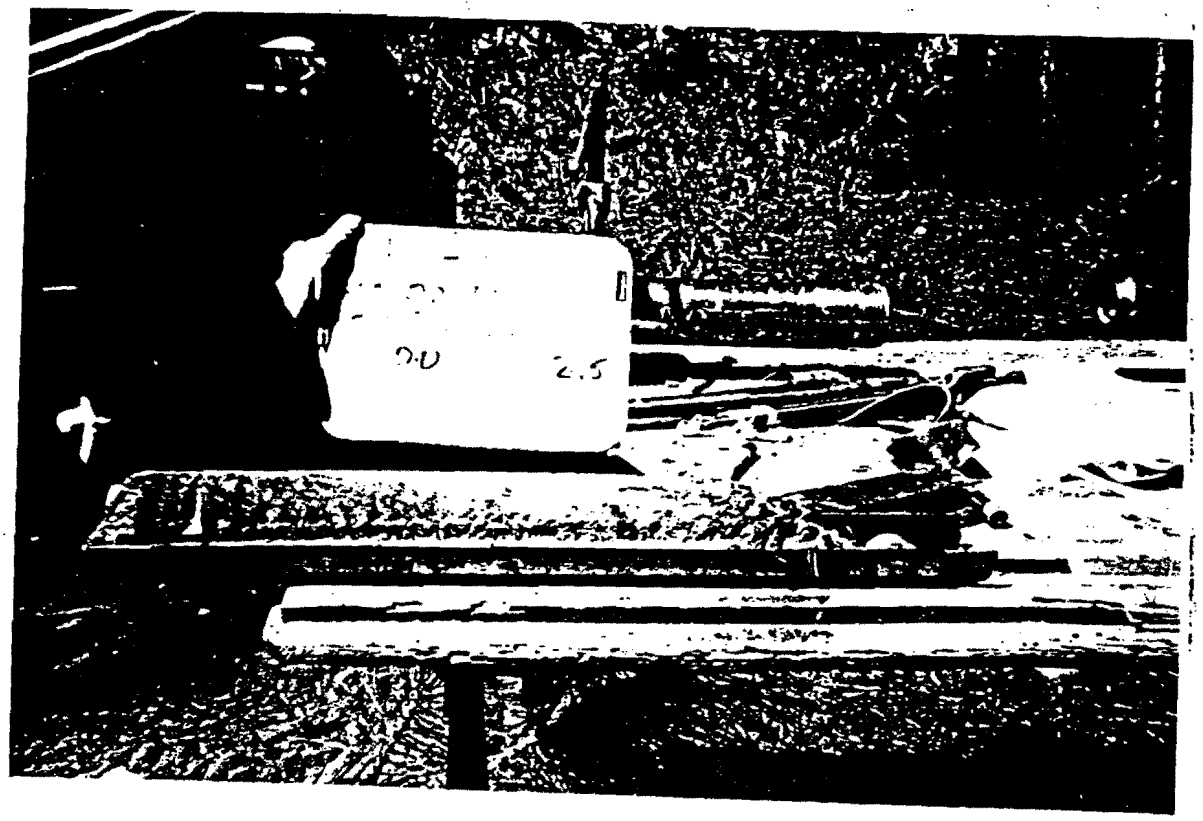
PRS 02- 009(c)
Top: 12.5' Bottom: 13.0'



Location 02- 01231
PRS 02- 009(c)
Top: 13.0' Bottom: 15.0'

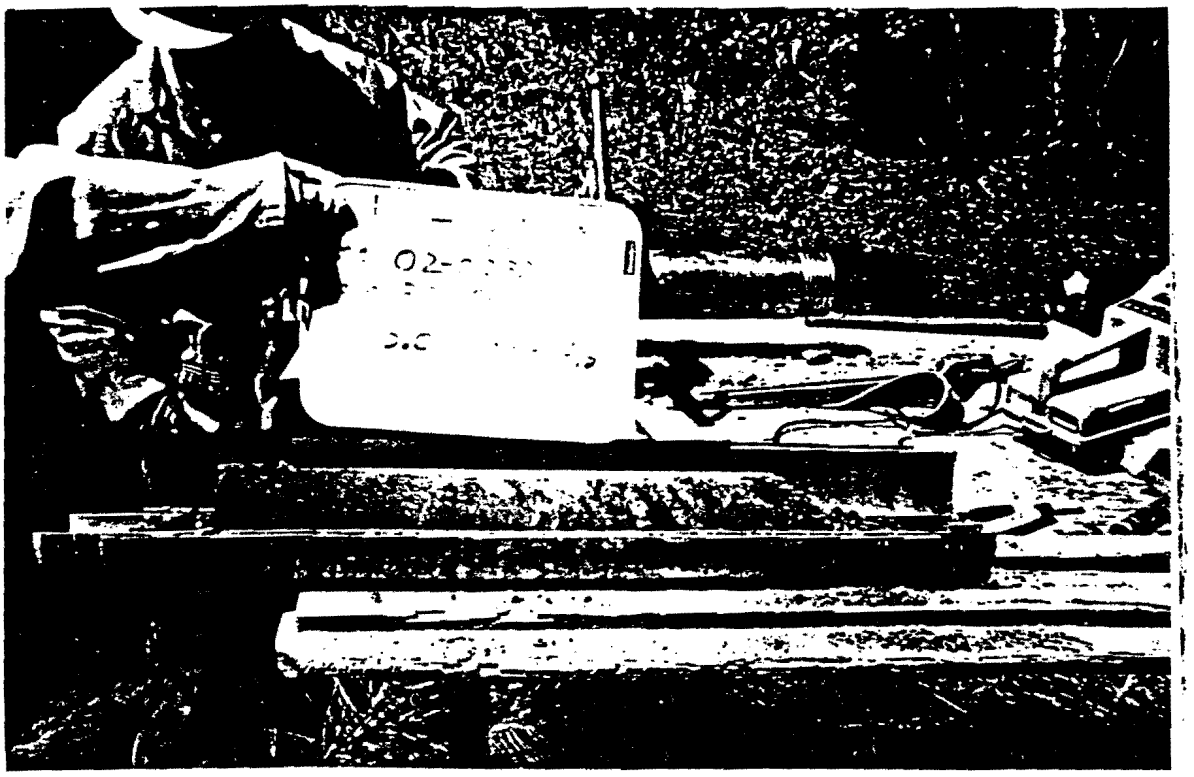


009(c)
Top: 0.0 Bottom: 2.5'

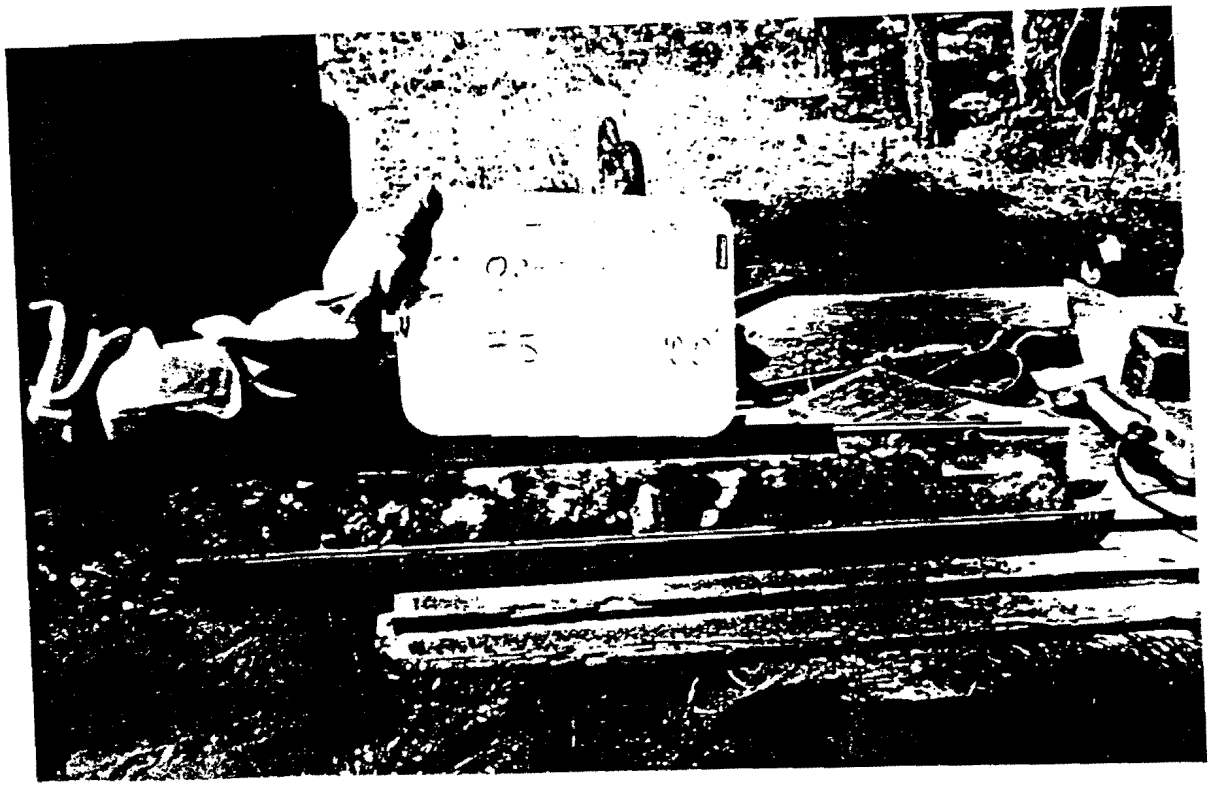


Location 02- 01232
PRS 02- 009(c)
Top: 2.5' Bottom: 5.0'

Location 02-[illegible]
PRS 02-009(c)
Top: 5.0' Bottom: 7.5'

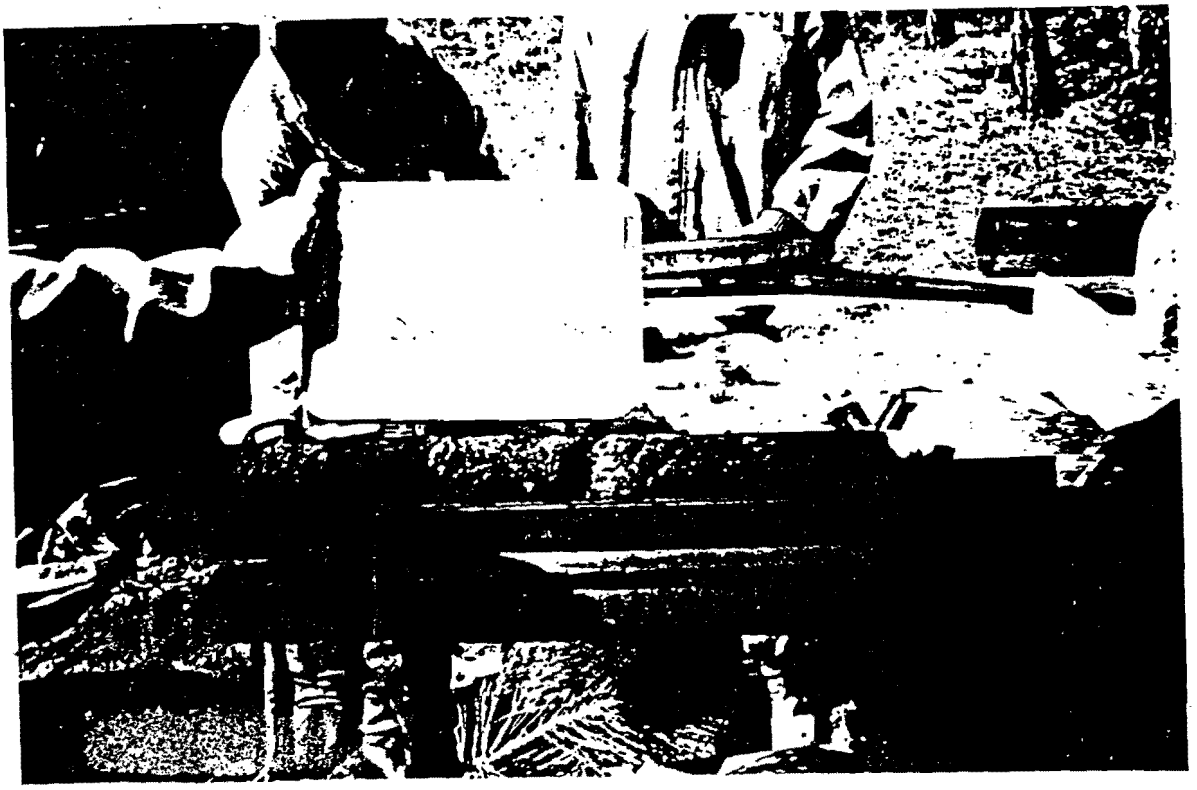


Location 02-01232
PRS 02-009 (c)
Top: 7.5' Bottom: 10.0'

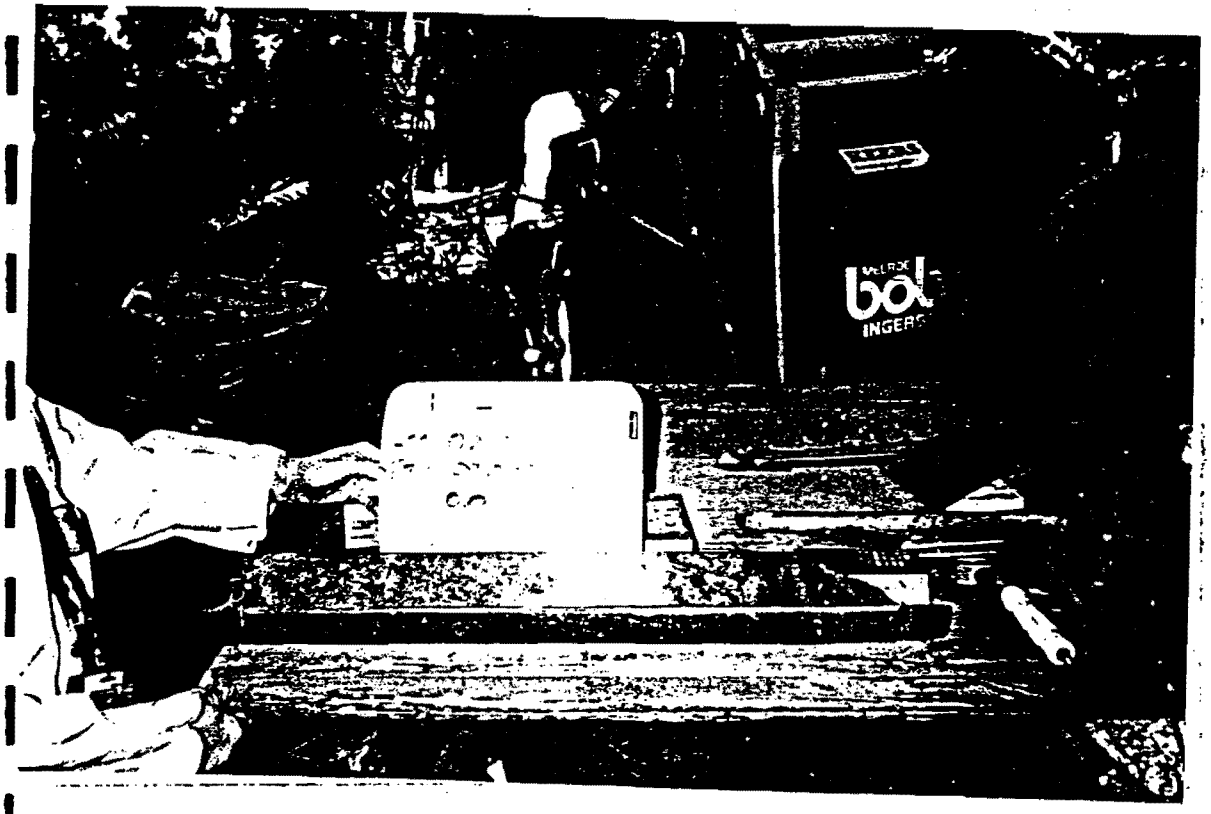


Top: 10.0' Bottom: 11.0'

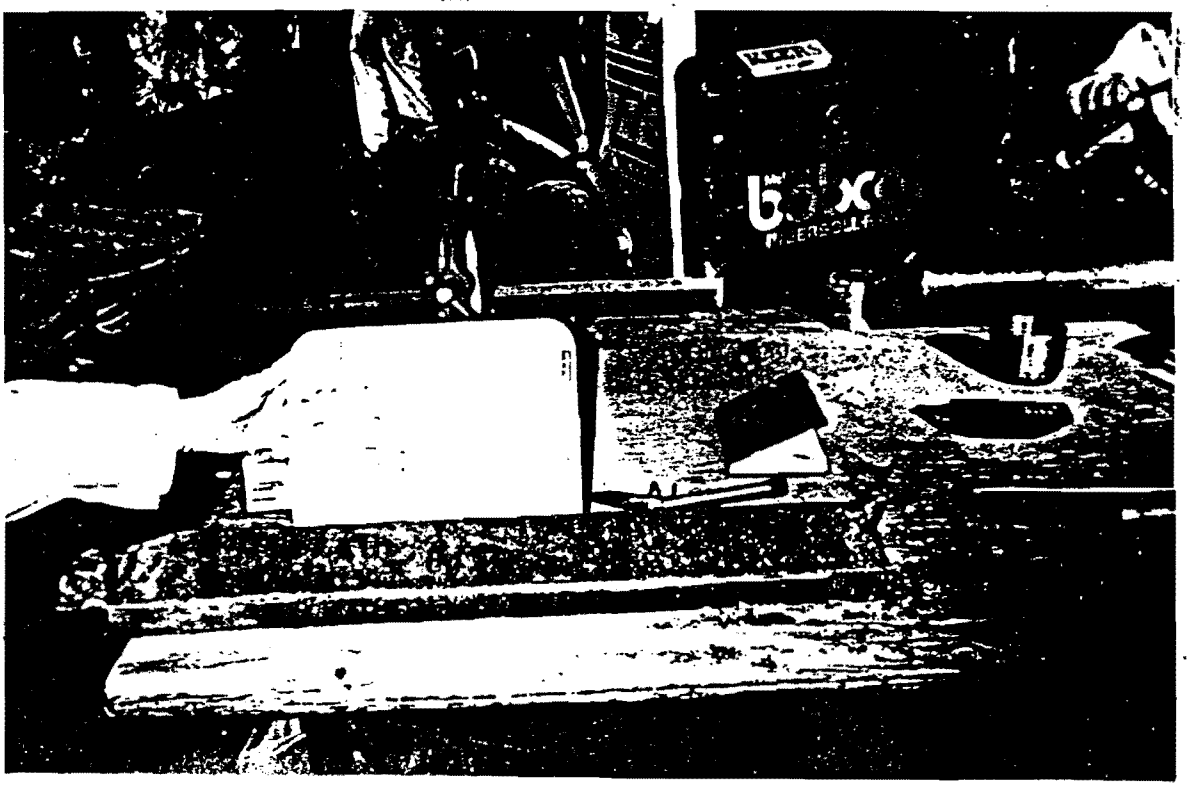
Location 02- 01232
PRS 02- 009(c)
Top: 12.5' Bottom: 15.0'



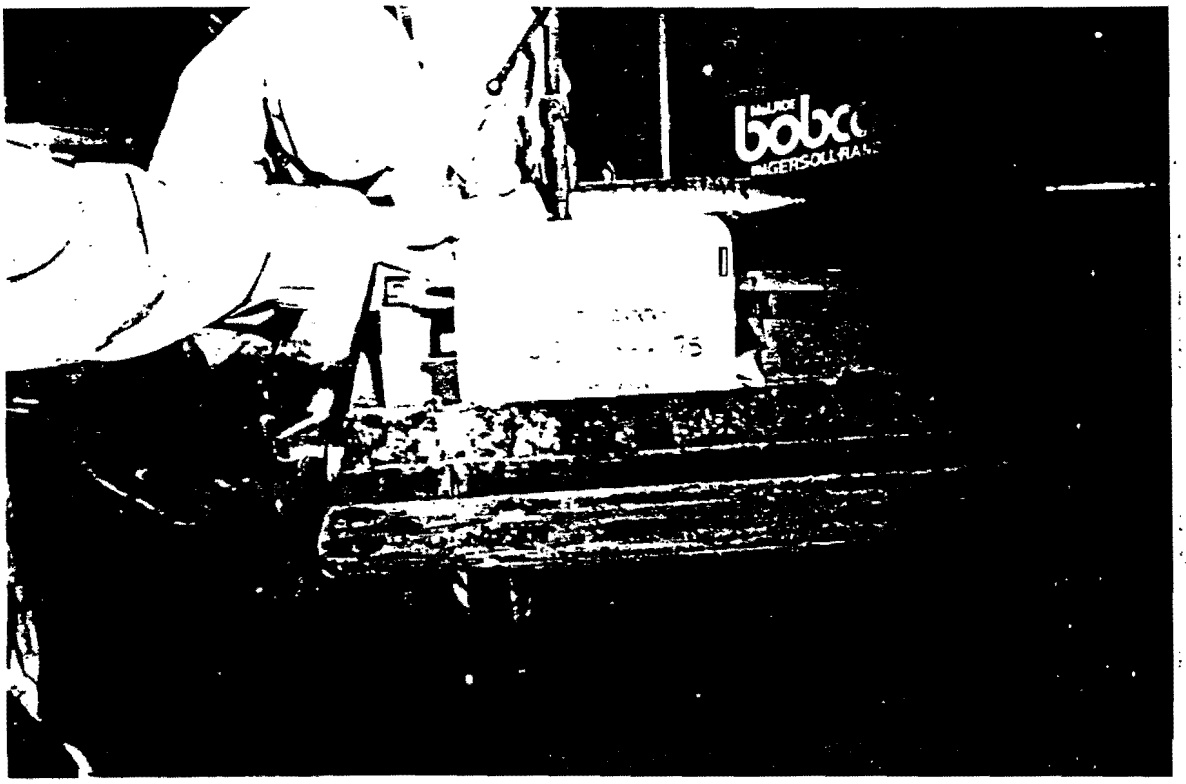
Top: 0.0 Bottom: 2.5'



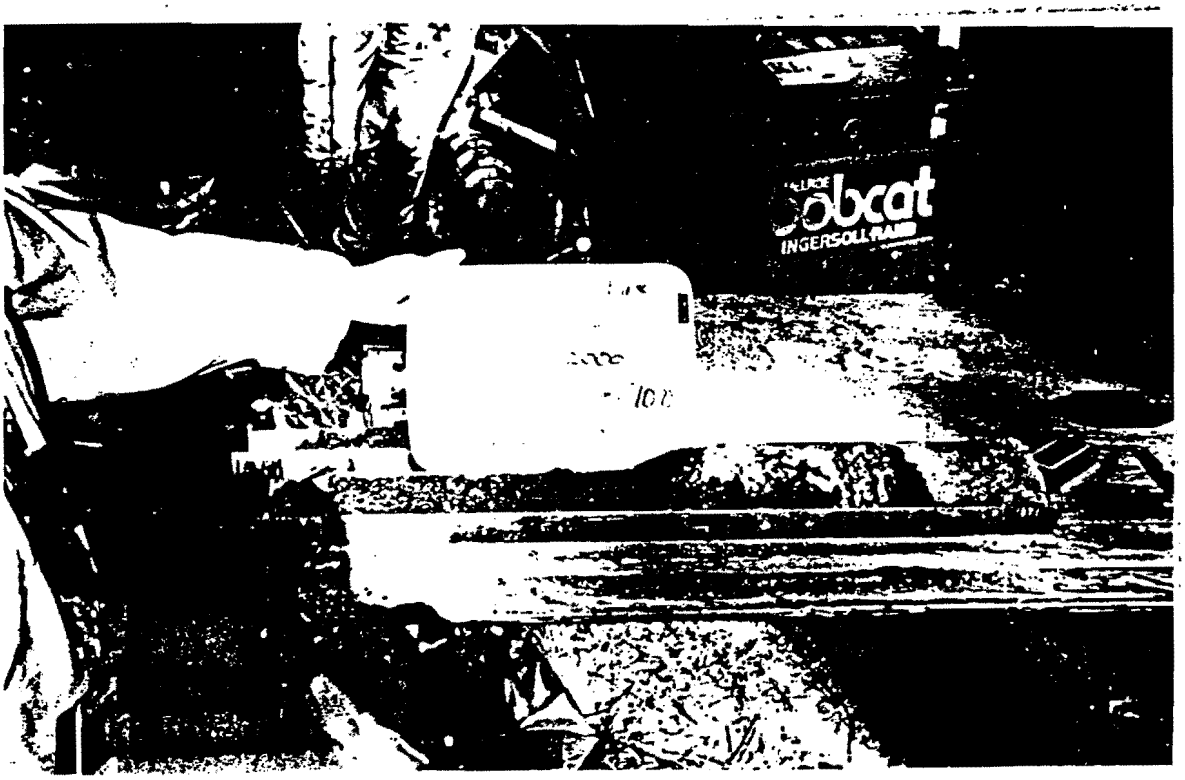
Location 02- 01233
PRS 02- 009(c)
Top: 2.5' Bottom: 5.0'



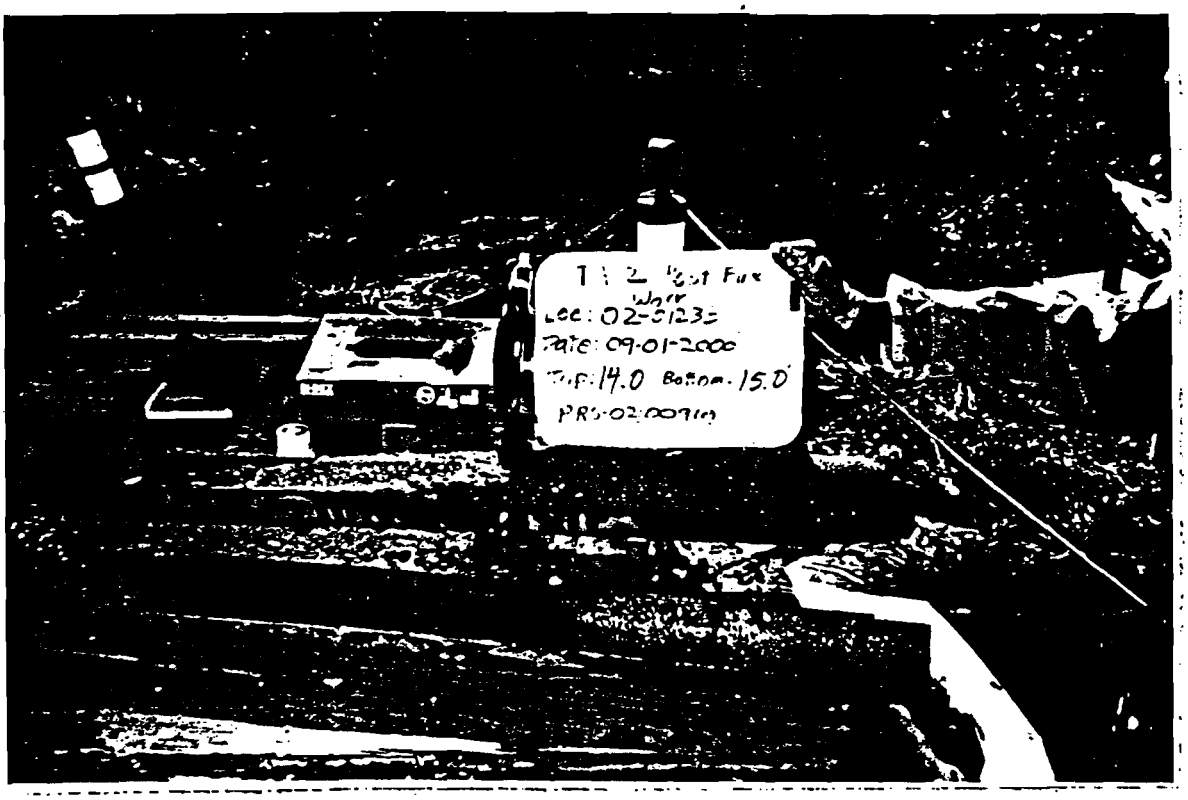
Location 02- [illegible]
PRS 02- 009(c)
Top: 5.0' Bottom: 7.5'



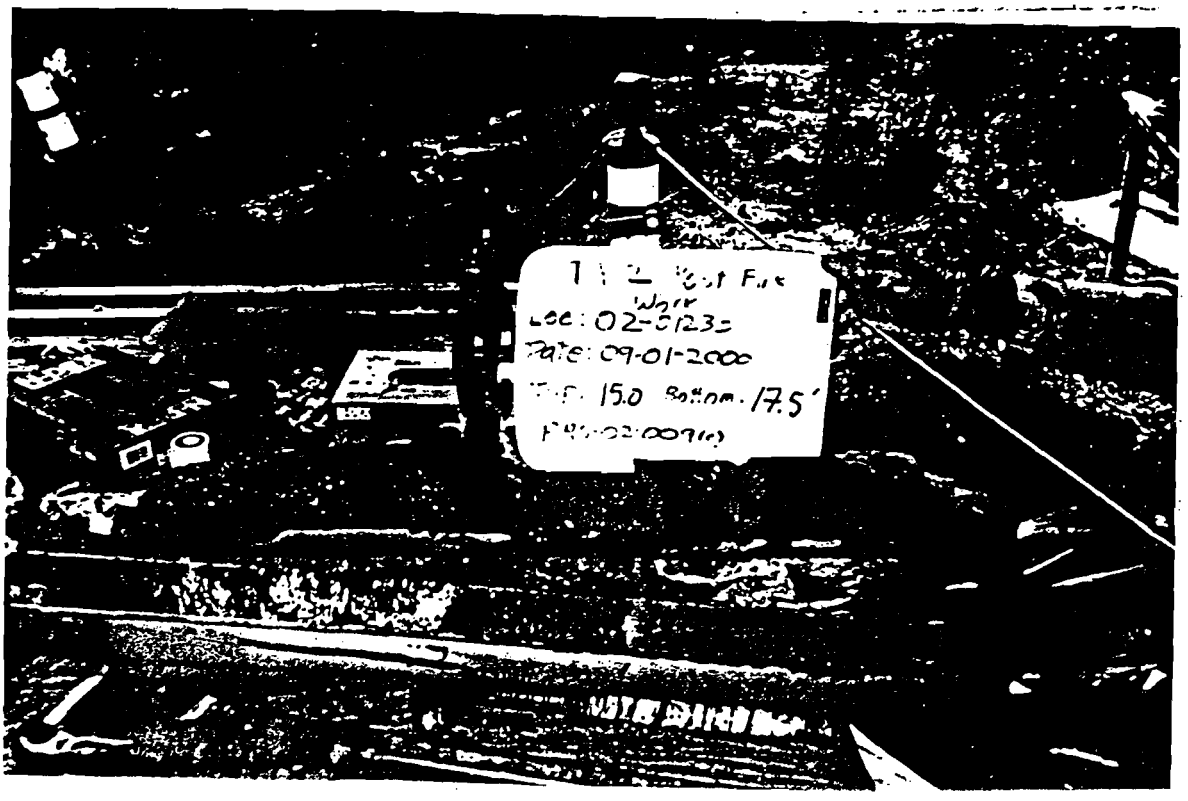
Location 02- 01233
PRS 02- 009(c)
Top: 7.5' Bottom: 10.0'



Top: 14.0' Bottom: 15.0'

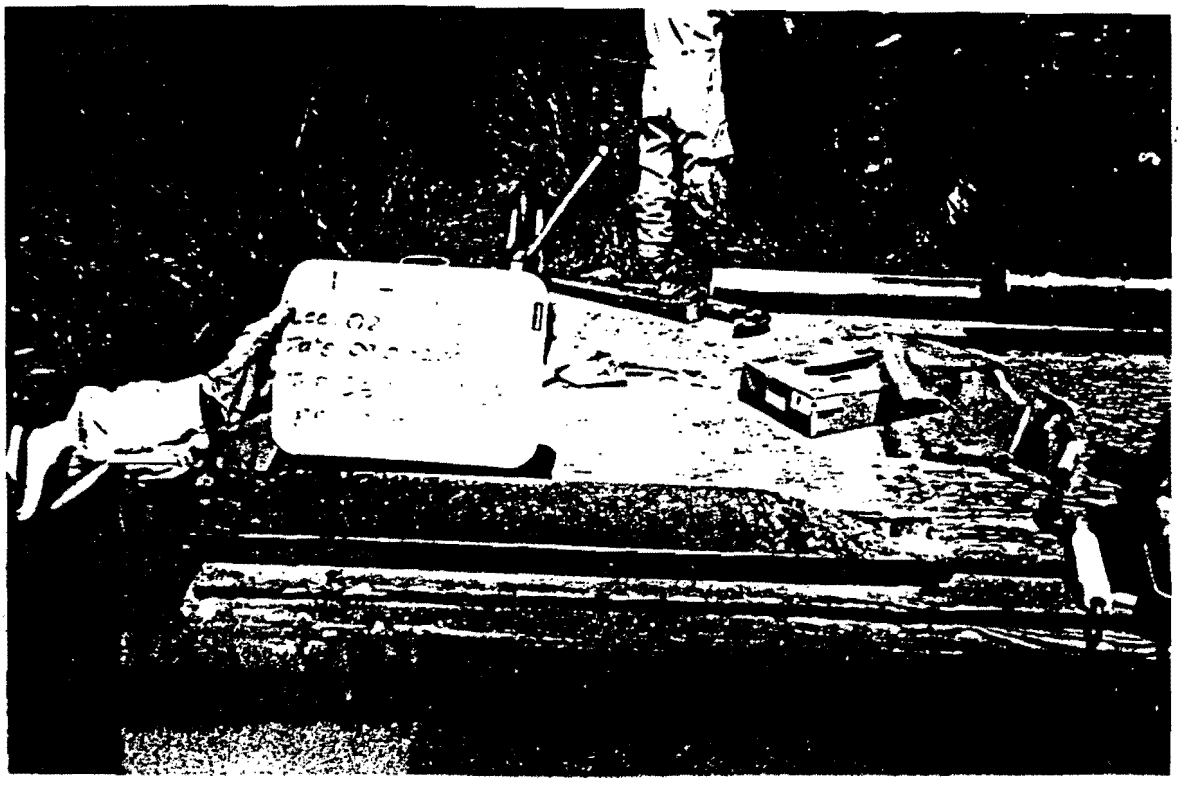


Location 02- 01233
PRS 02- 009 (c)
Top: 15.0' Bottom: 17.5'



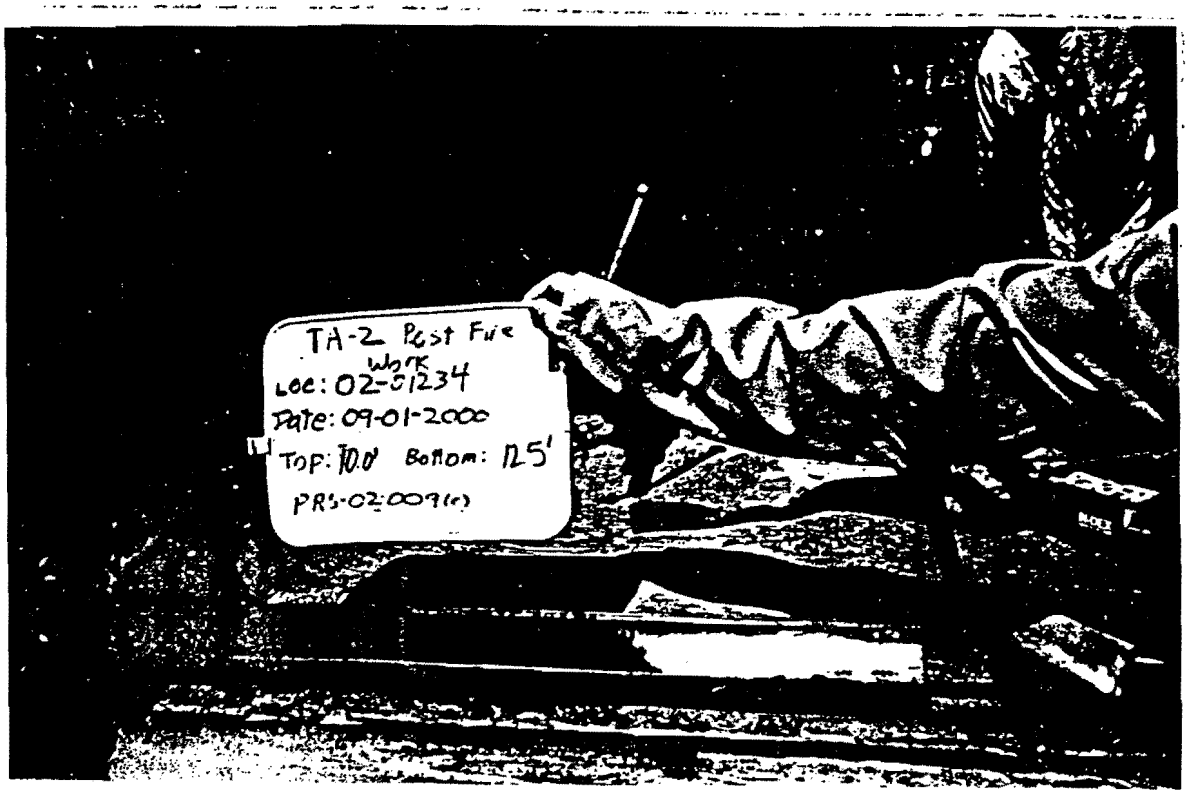
PRS 02- 009(c)
Top: 0.0 Bottom: 2.5'

Location 02- 01234
PRS 02- 009(c)
Top: 2.5' Bottom: 5.0'

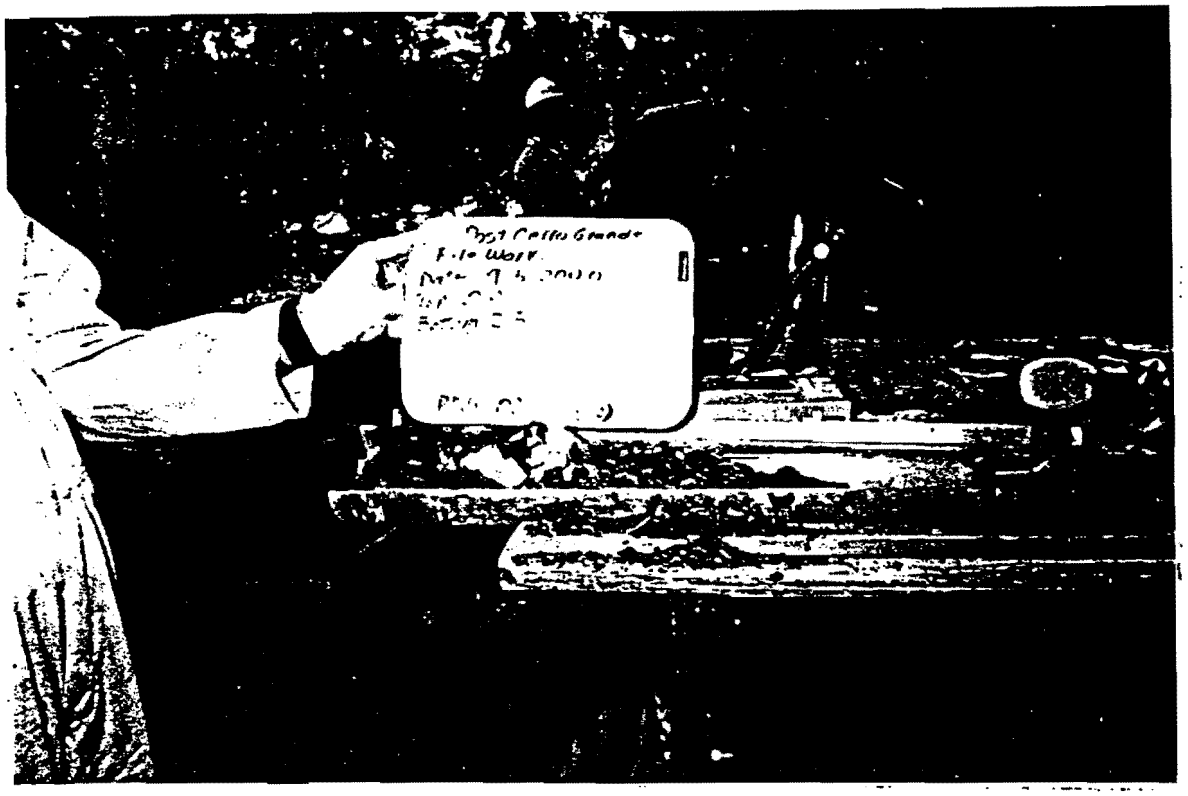


PRS 02- 009(c)
Top: 7.5' Bottom: 10.0'

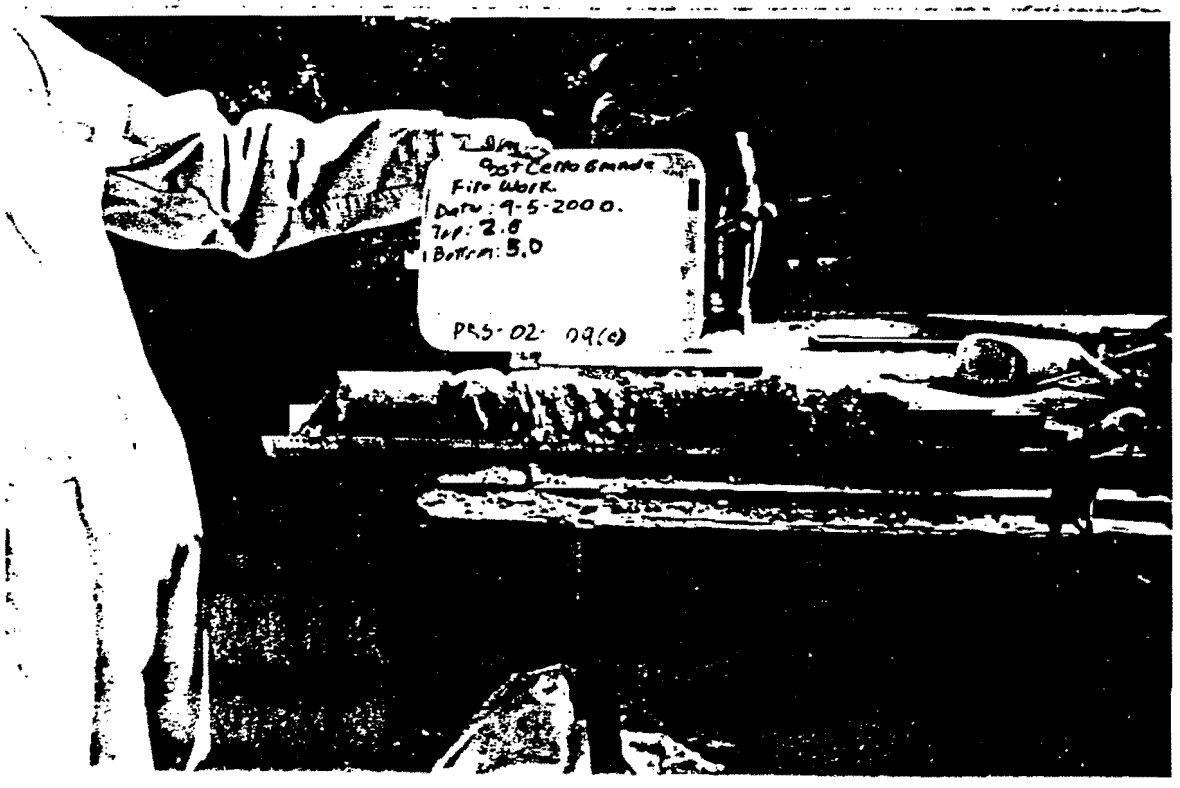
Location 02- 01234
PRS 02- 009(c)
Top: 10.0' Bottom: 12.5'



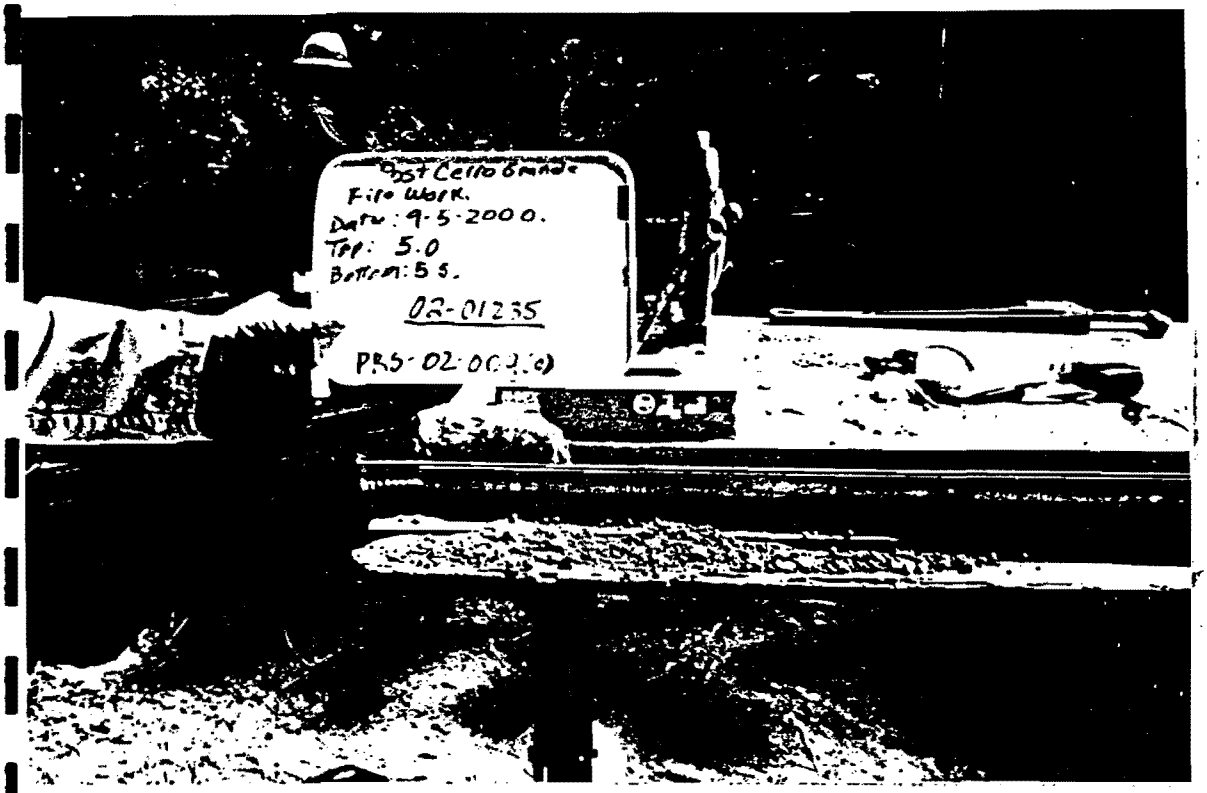
PRS 02- 009(c)
Top: 0.0 Bottom: 2.5'



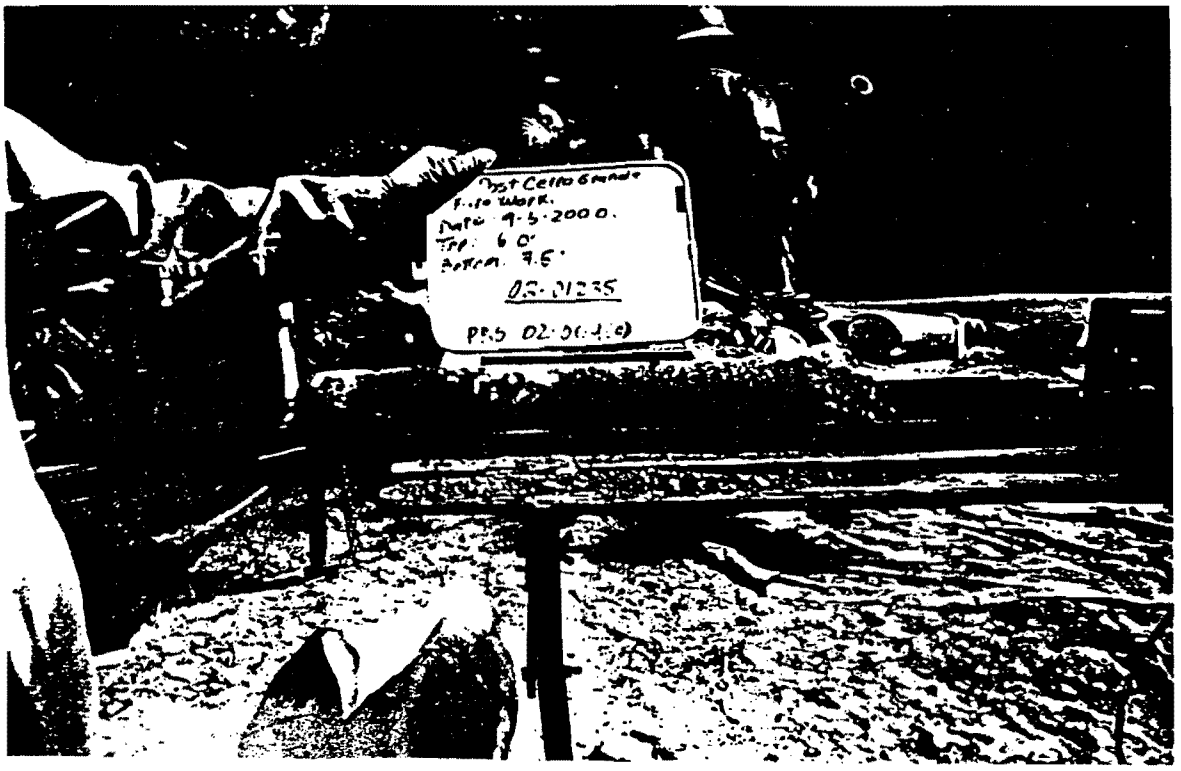
Location 02- 01235
PRS 02- 009(c)
Top: 2.5' Bottom: 5.0'



Location 02- 01235
PRS 02- 009(c)
Top: 5.0' Bottom: 5.5'

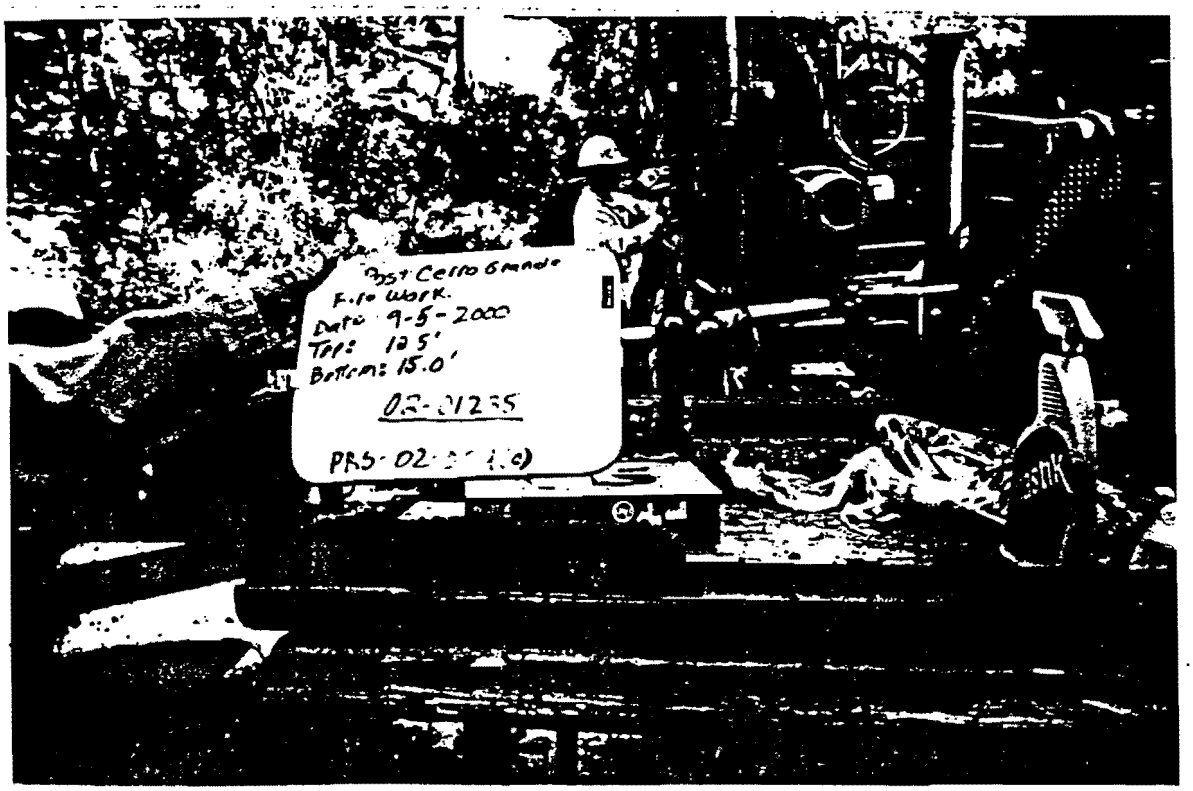


Location 02- 01235
PRS 02- 009(c)
Top: 6.0' Bottom: 7.5'



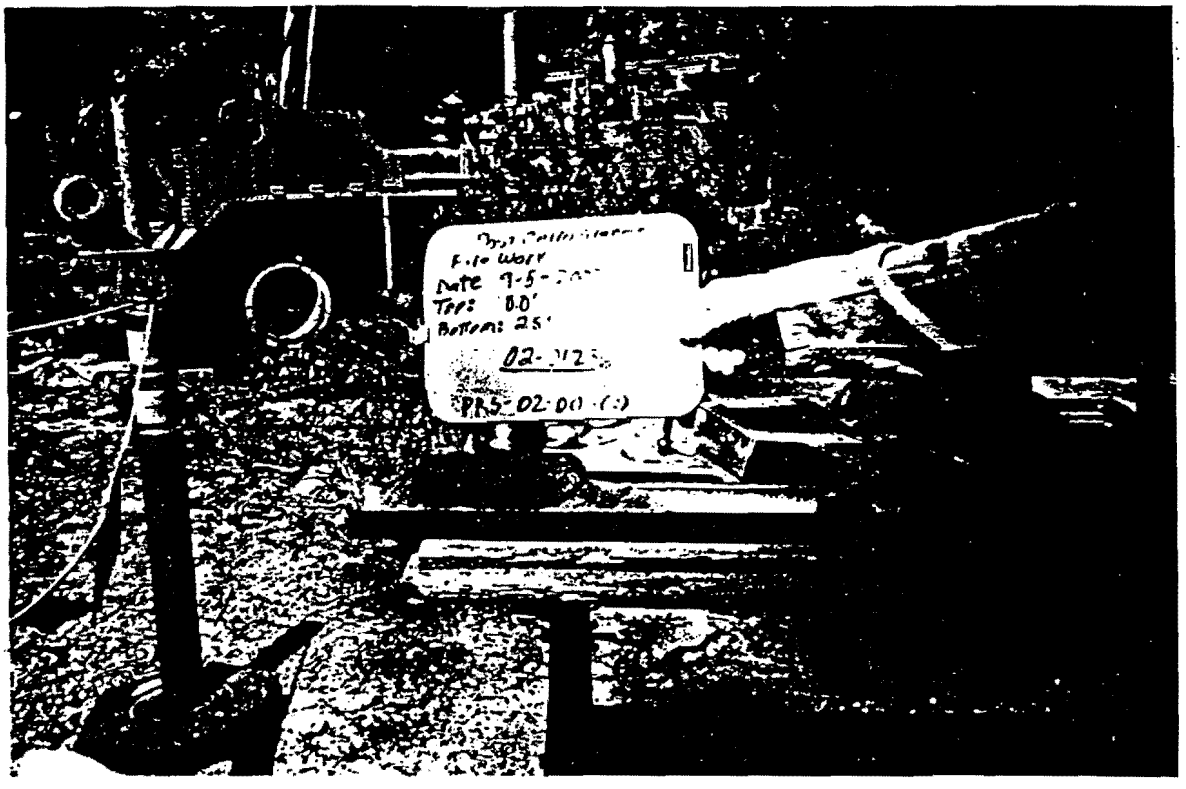
PRS 02-[illegible]
Top: 10.0' Bottom: 12.5'

Location 02-01235
PRS 02-009(c)
Top: 12.5' Bottom: 15.0'

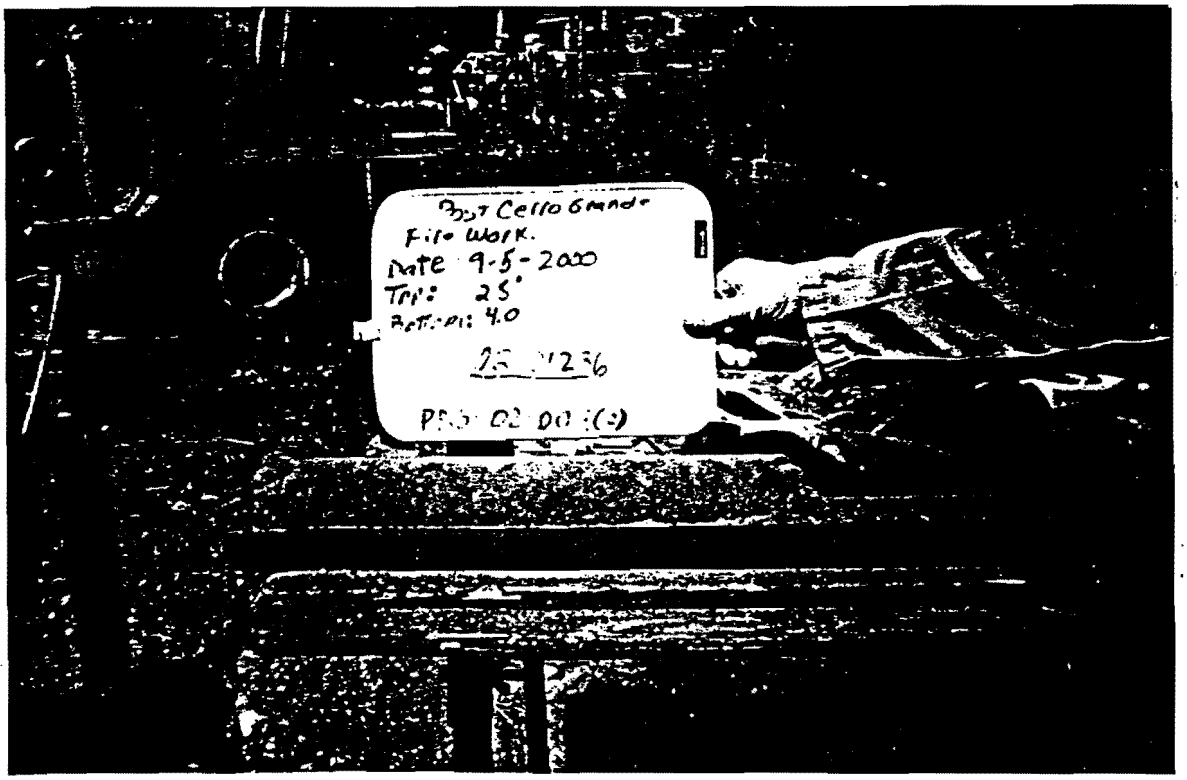


Top: 15.0' Bottom: 17.5'

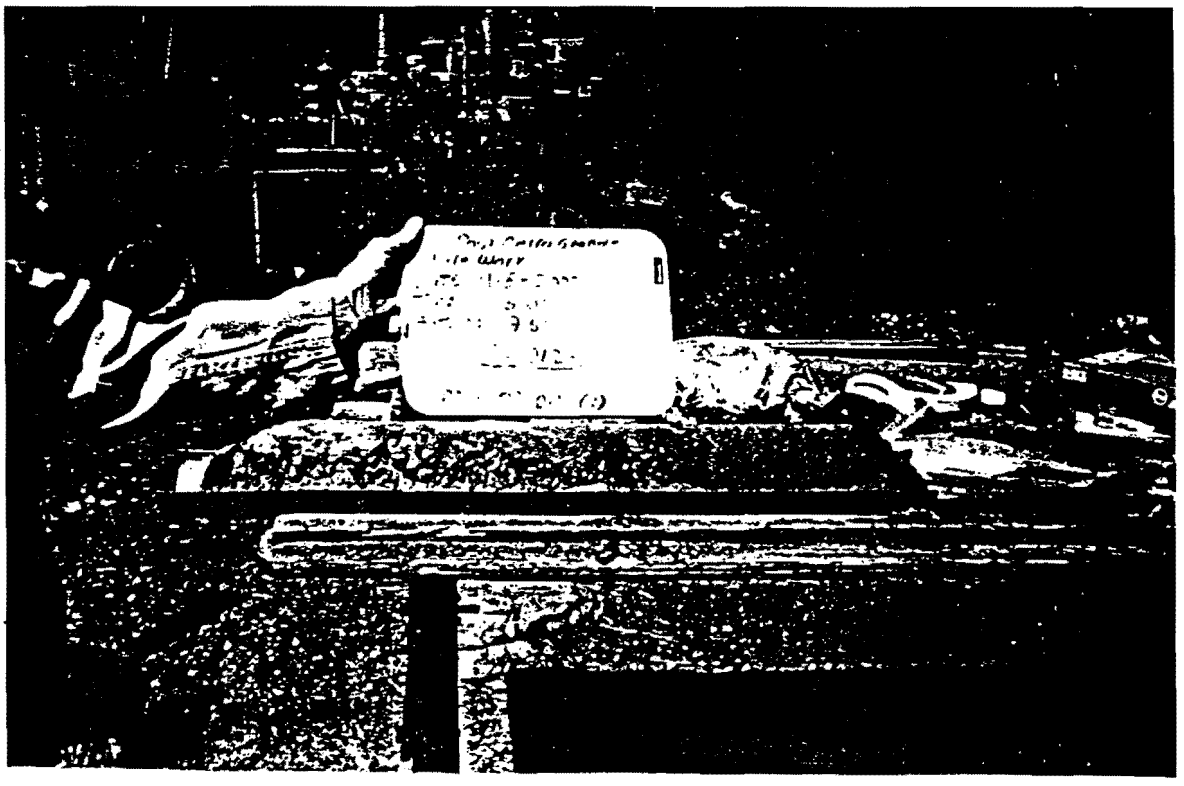
Location 02-01236
PRS 02- 009(c)
Top: 0.0 Bottom: 2.5'



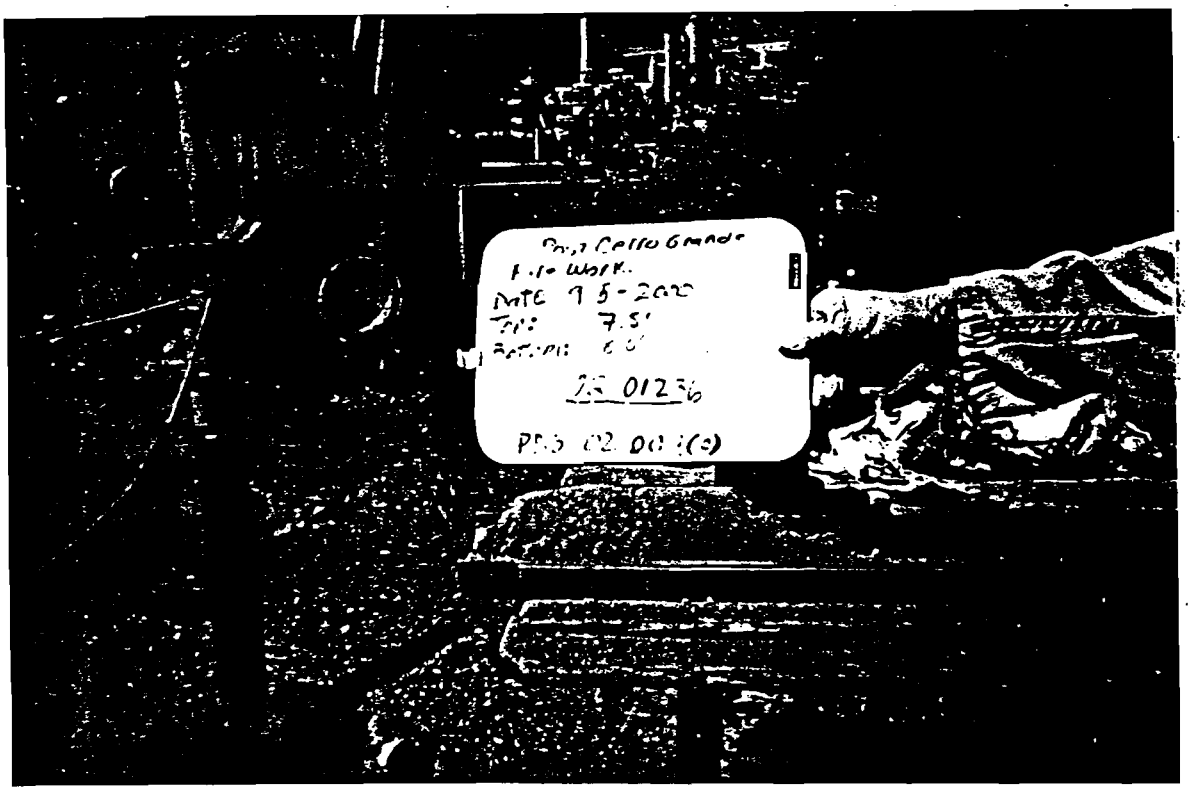
PRS 02- 009 (c)
Top: 2.5' Bottom: 4.0'



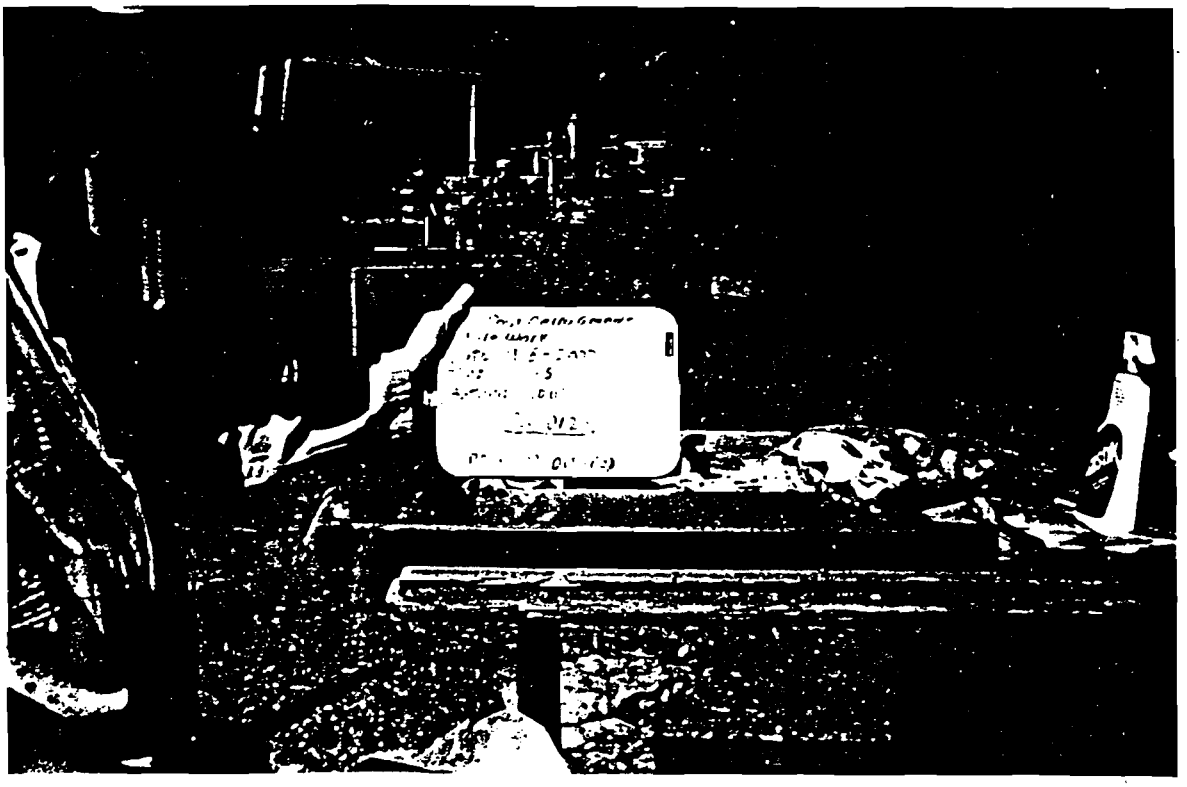
Location 02- 01236
PRS 02- 009 (c)
Top: 5.0' Bottom: 7.5'



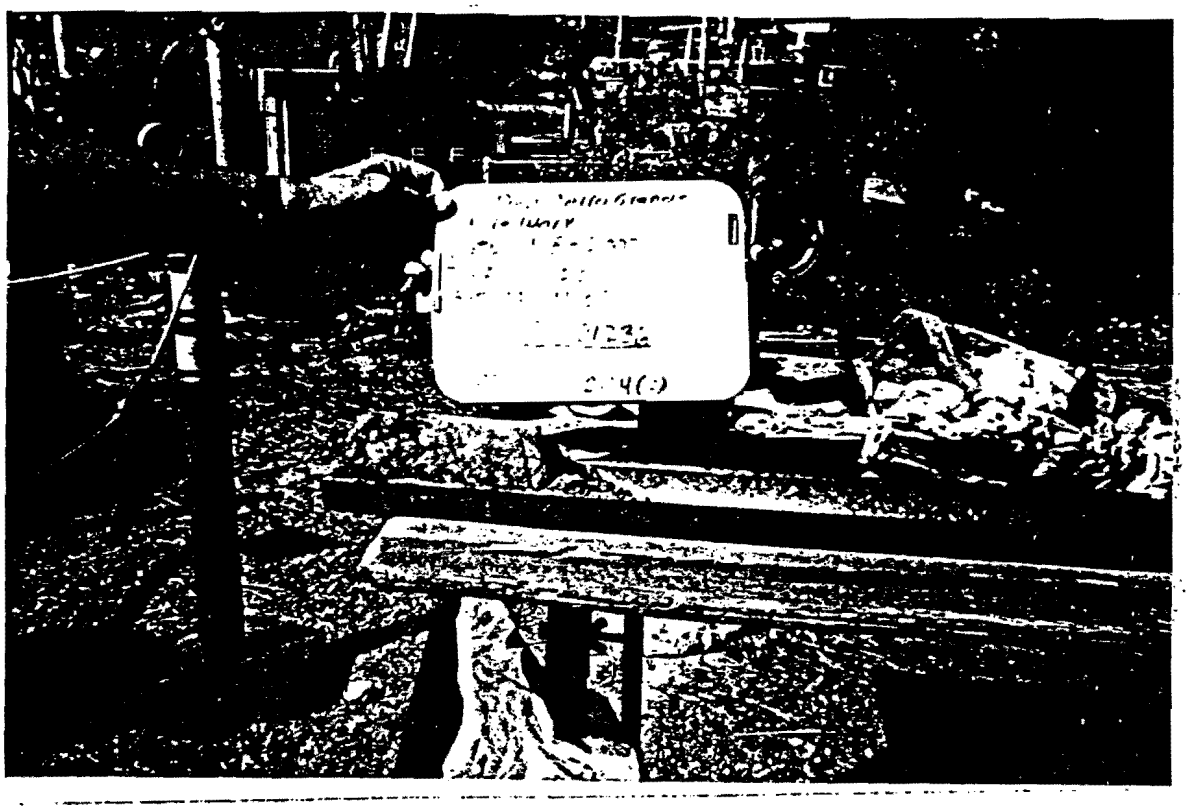
PRS 02- 009 (c)
Top: 7.5' Bottom: 8.0'



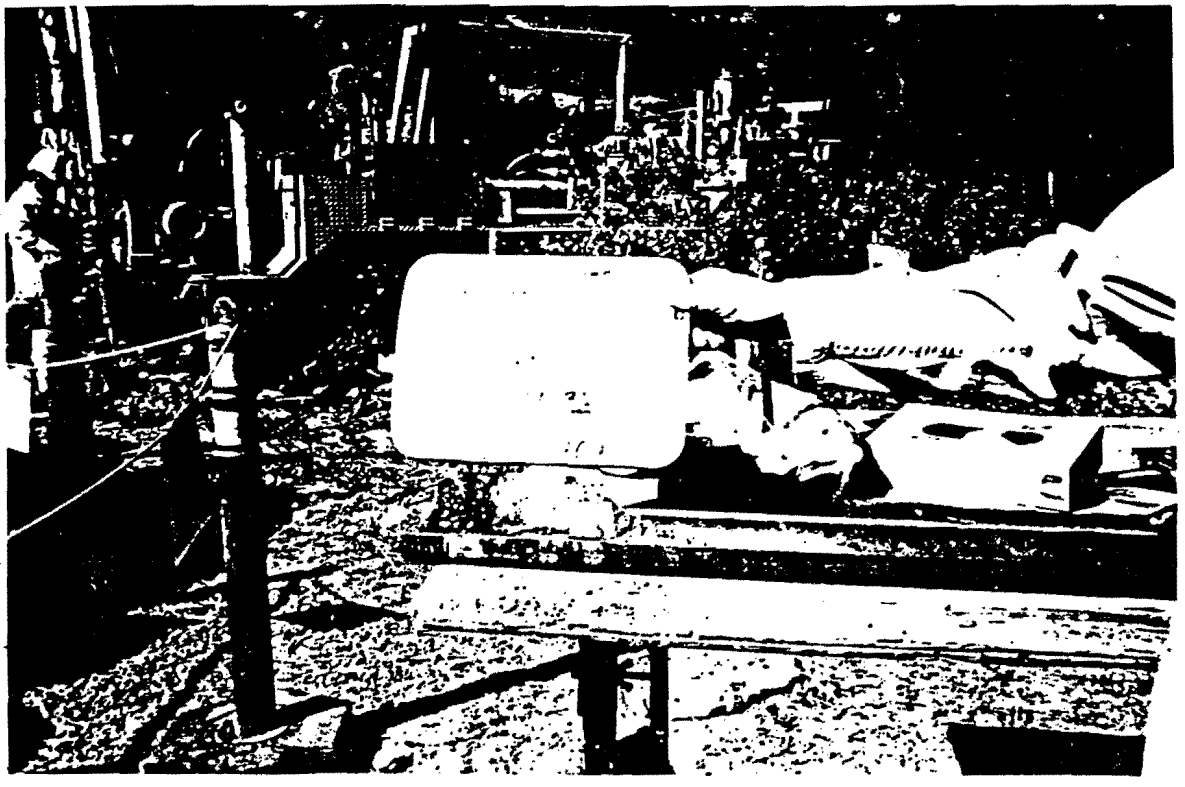
Location 02- 01236
PRS 02- 009(c)
Top: 8.5' Bottom: 10.0'



Location 02-[illegible]
PRS 02- 009(c)
Top: 10.0 'Bottom: 11.0'

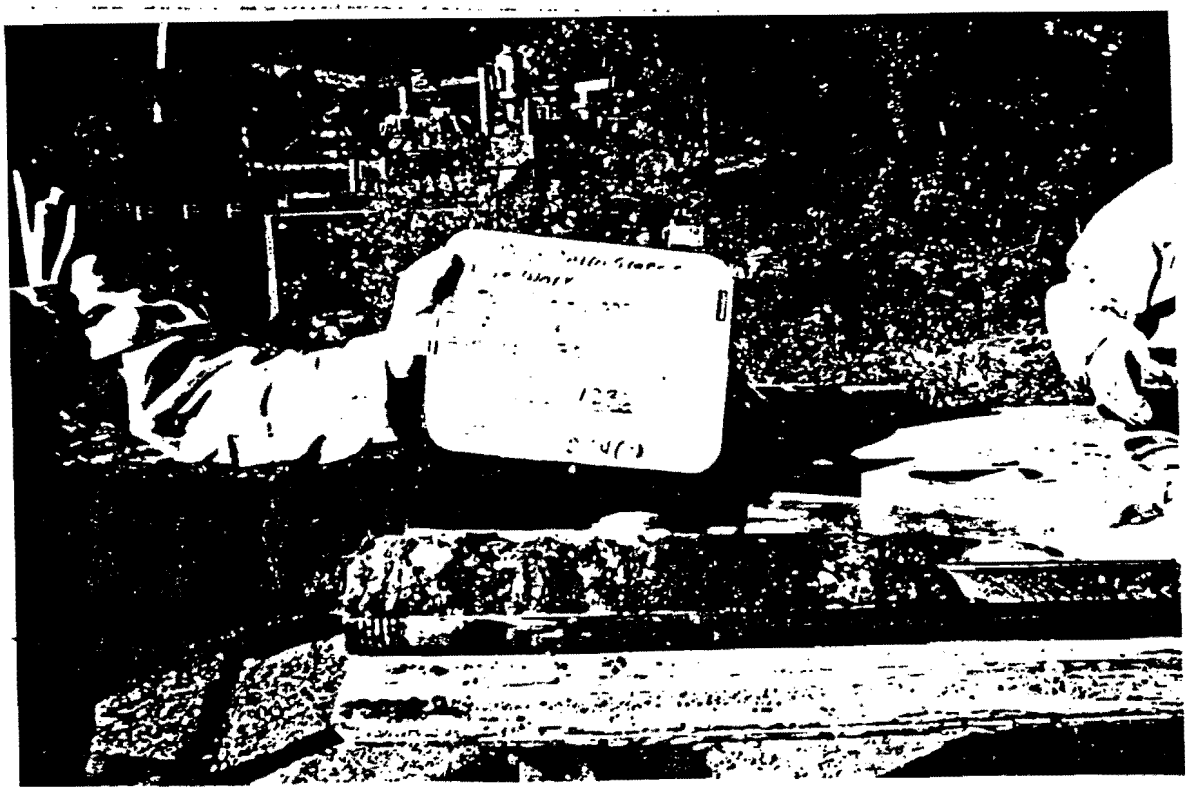


Location 02- 01236
PRS 02- 009(c)
Top: 11.5' Bottom: 12.5'

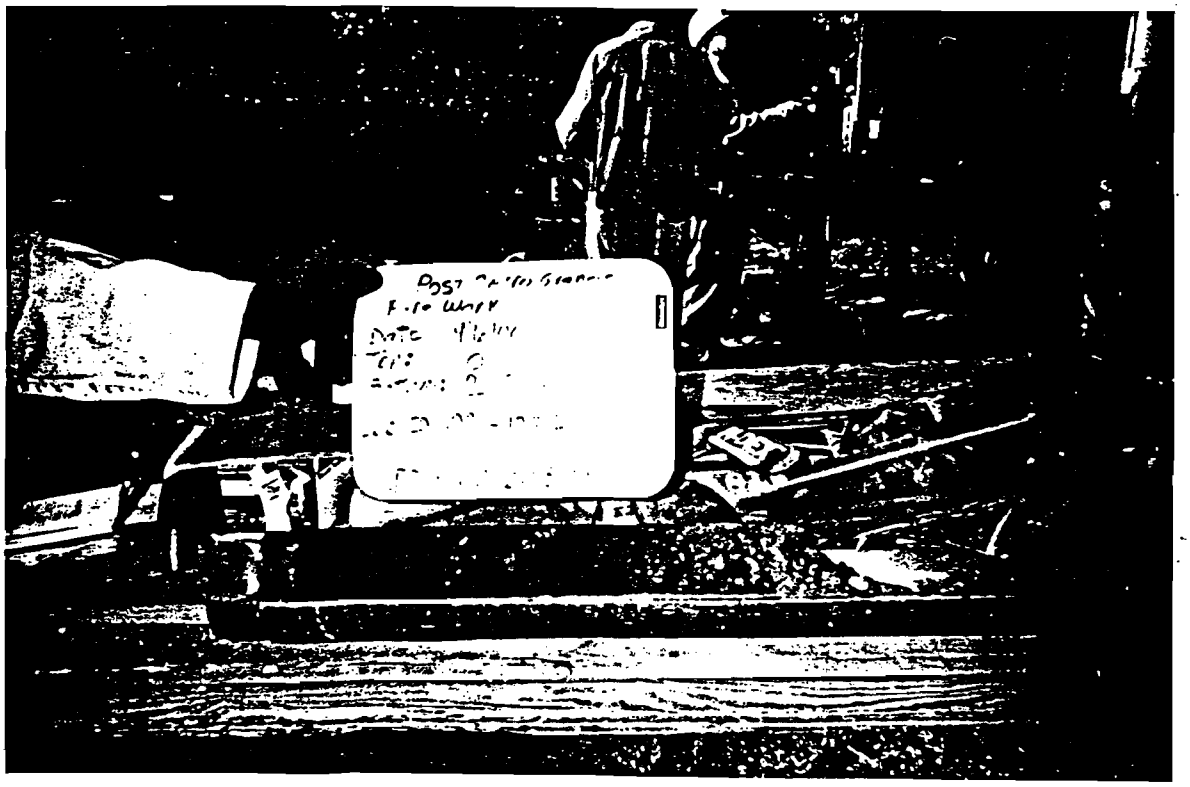


PRS 02- 009(c)
Top: 12.5' Bottom: 15.0'

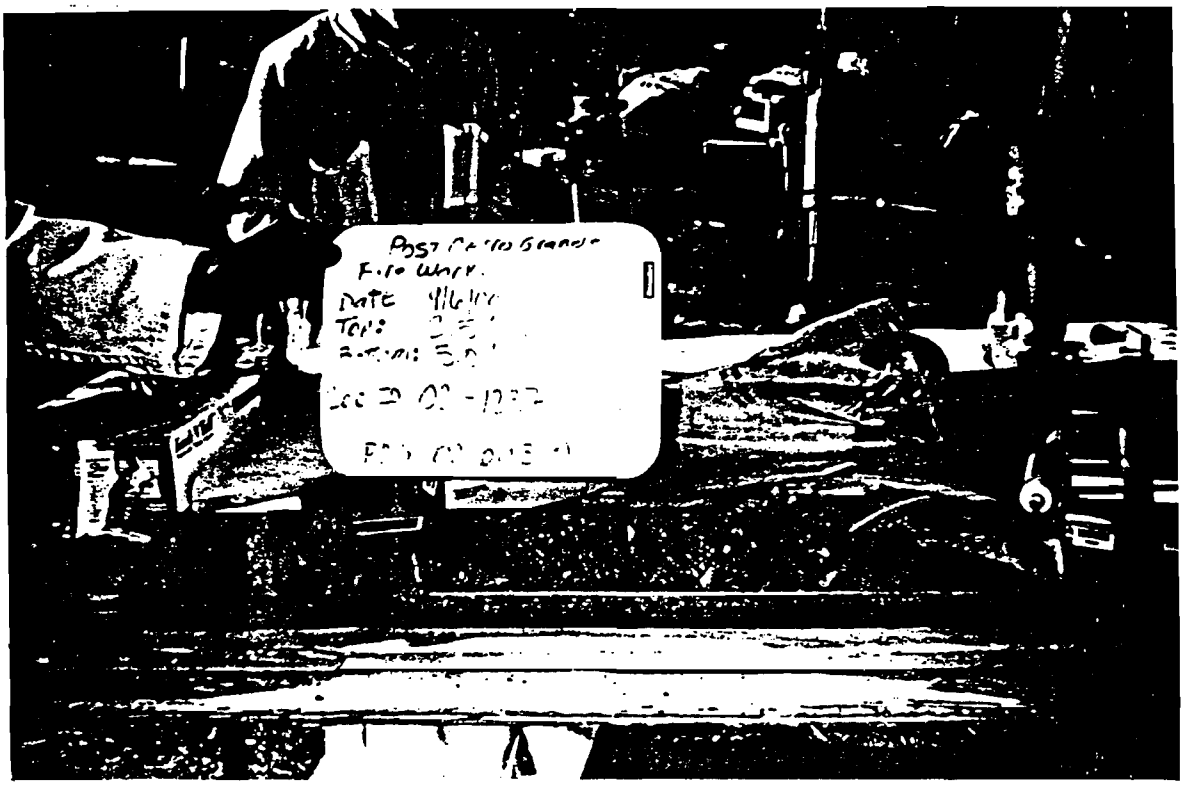
Location 02- 01236
PRS 02- 009(c)
Top: 16.0' Bottom: 17.5'



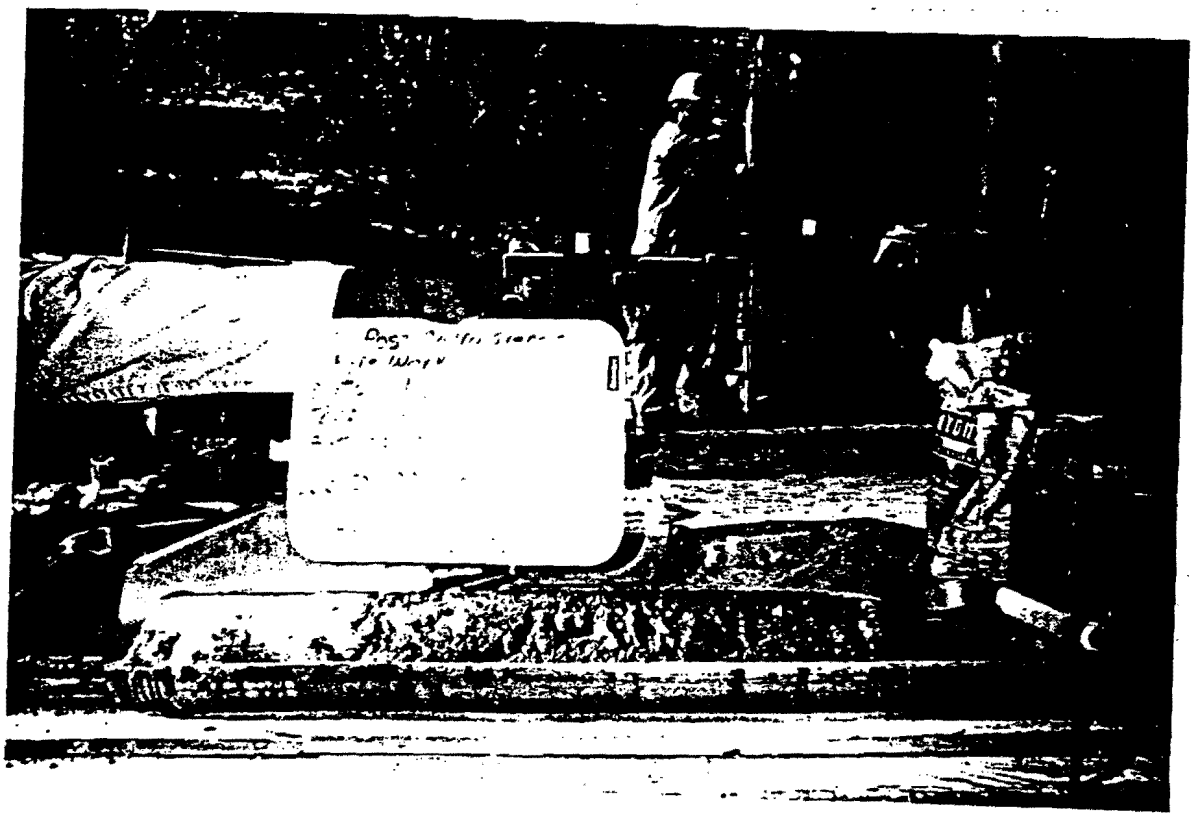
PRS 02- 003 (c)
Top: 0.0 Bottom: 2.5'



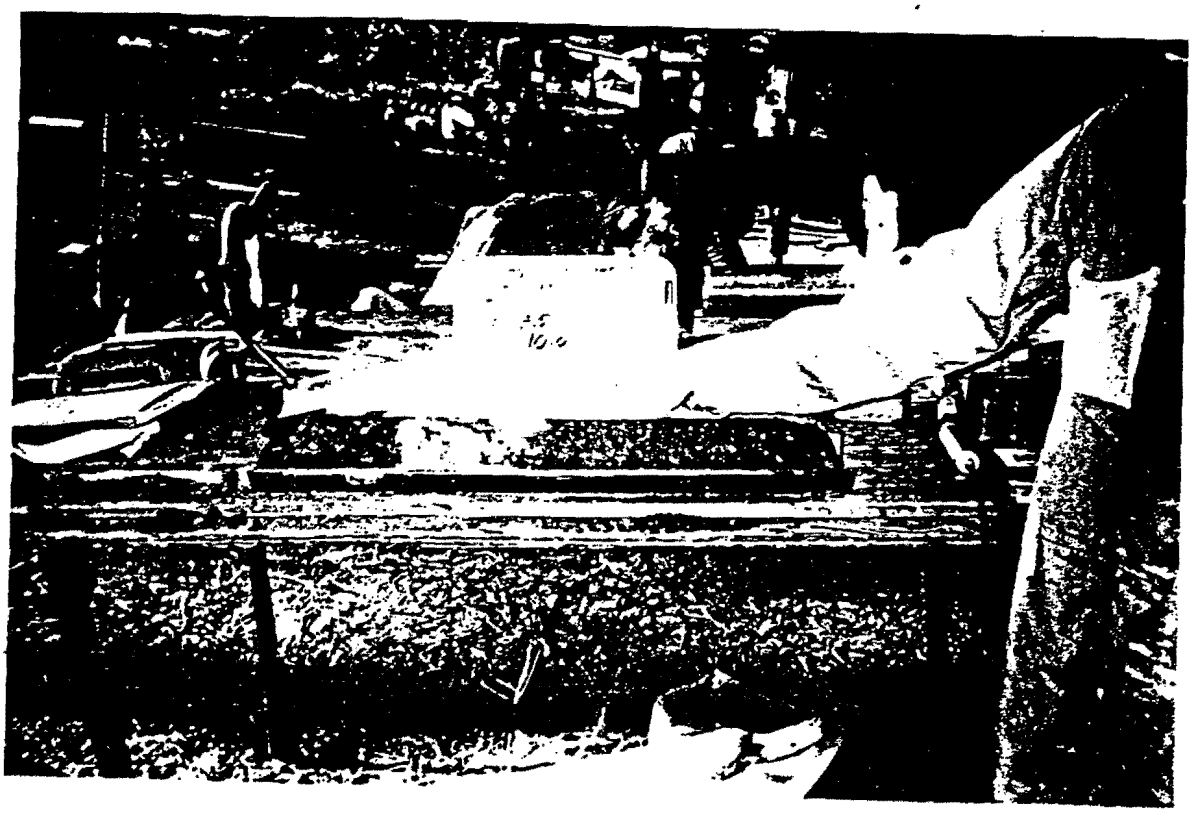
Location 02- 01237
PRS 02- 003(c)
Top: 2.5' Bottom: 5.0'



PRS 02- 003(c)
Top: 5.0' Bottom: 7.5'



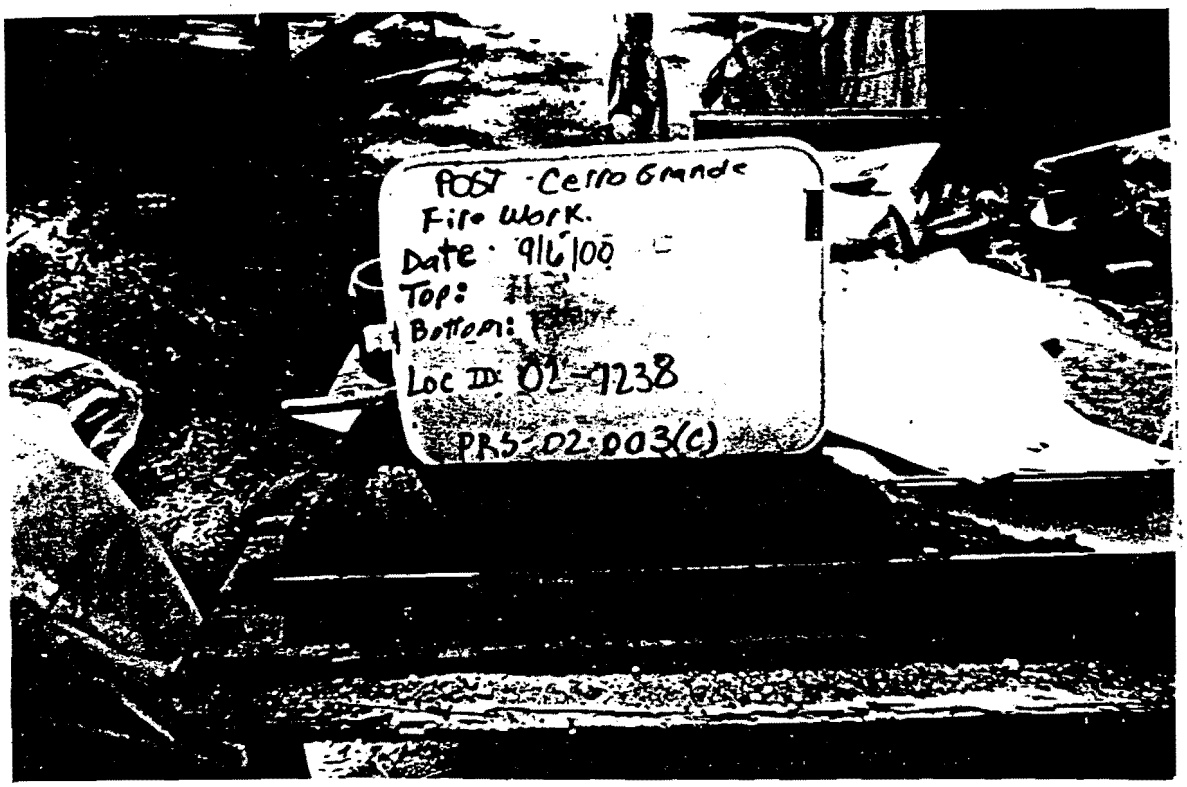
Location 02- 01237
PRS 02- 003(c)
Top: 7.5' Bottom: 10.0'



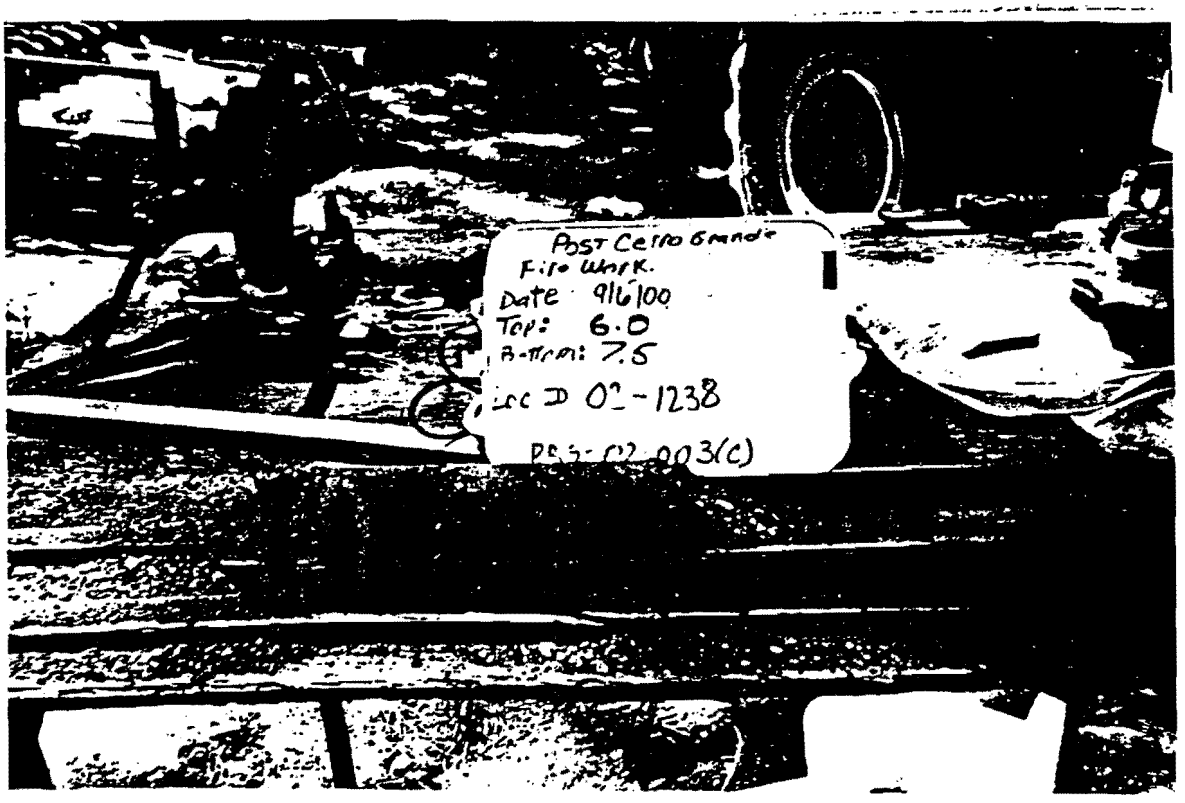
Top: 0.0 Bottom: 2.5'

Location 02- 01238
PRS 02- 003(C)
Top: 2.5' Bottom: 5.0'

Top: 5.0' Bottom: 6.0'

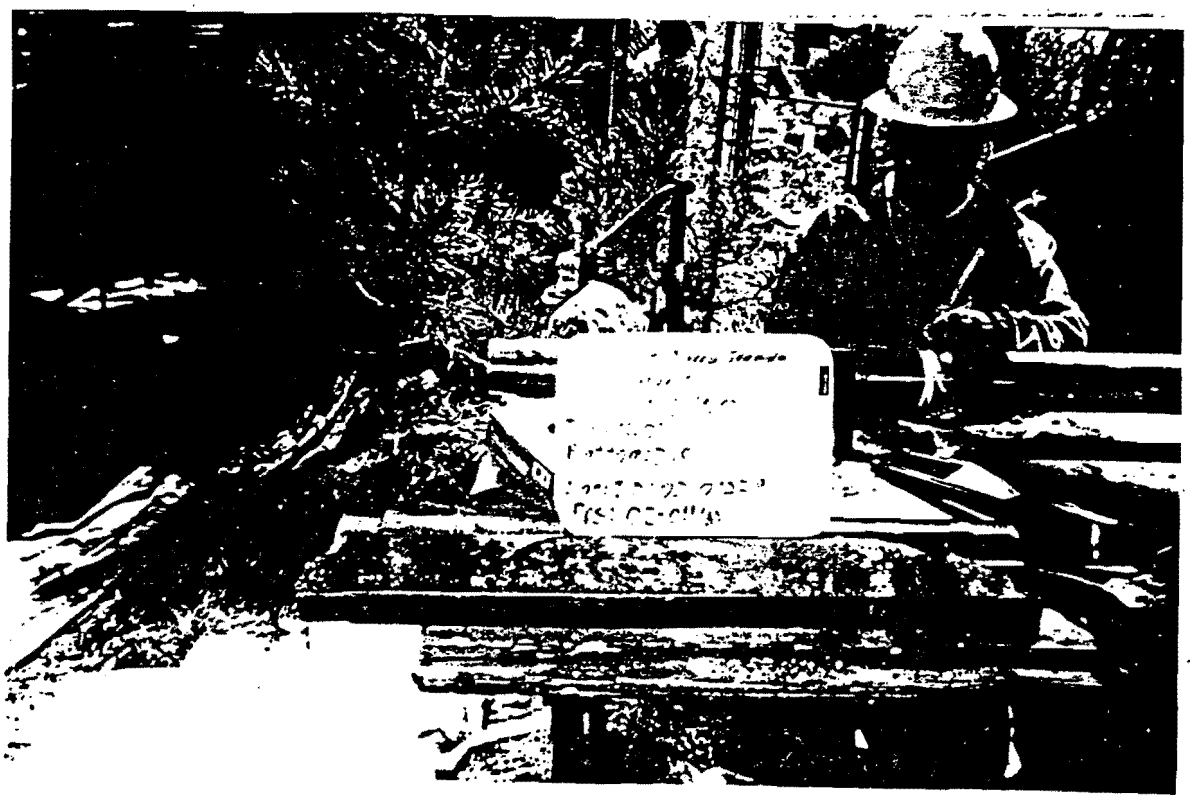


Location 02-01238
PRS 02-003(C)
Top: 6.0' Bottom: 7.5'

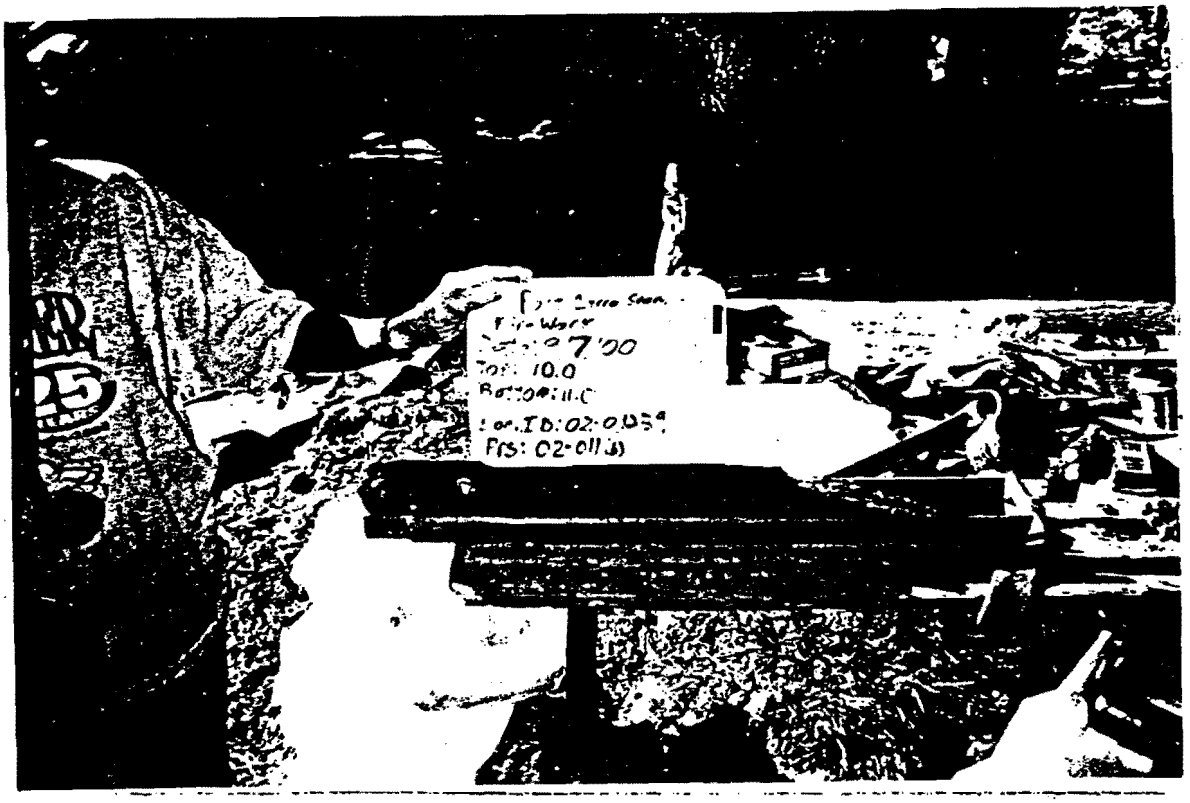


PRS 02- 003(C)
Top: 7.5' Bottom: 10.0'

Location 02- 01239
PRS 02- 011(6)
Top: 0.0 Bottom: 2.5'



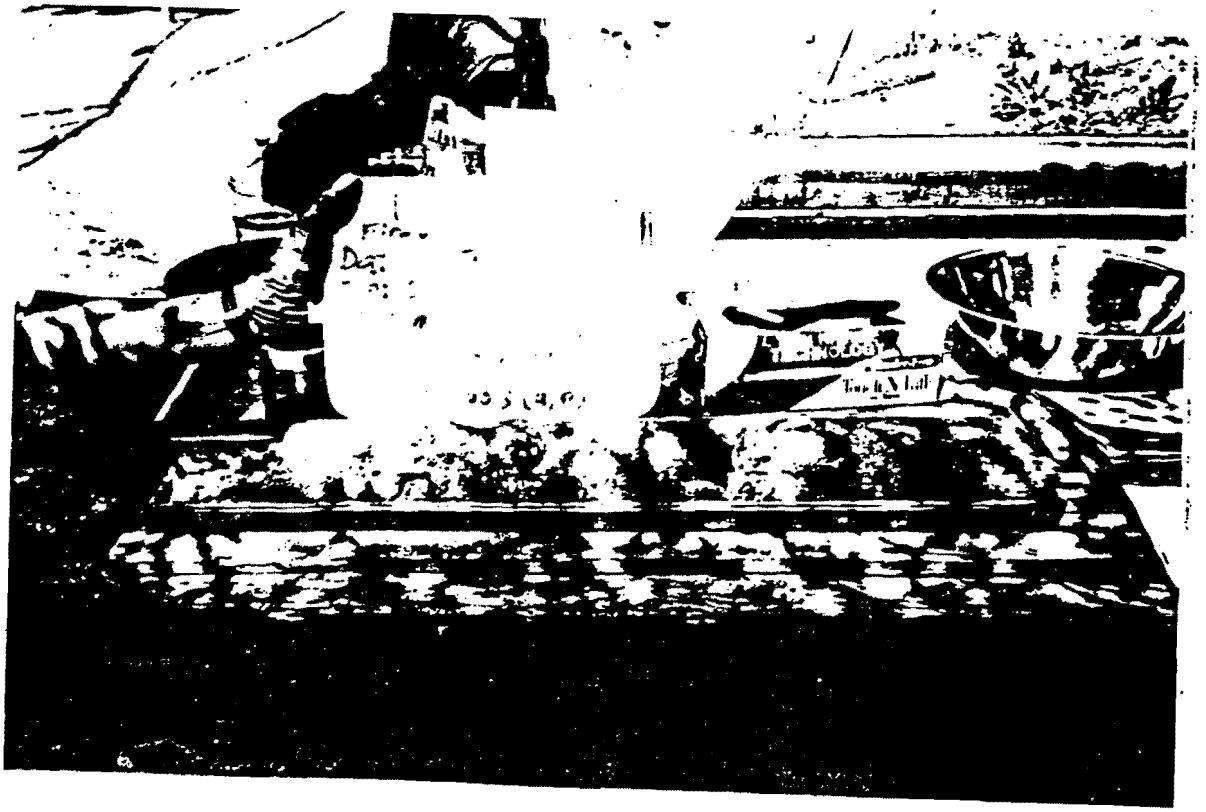
PRS 02-011(b)
Top: 10.0' Bottom: 11.0'



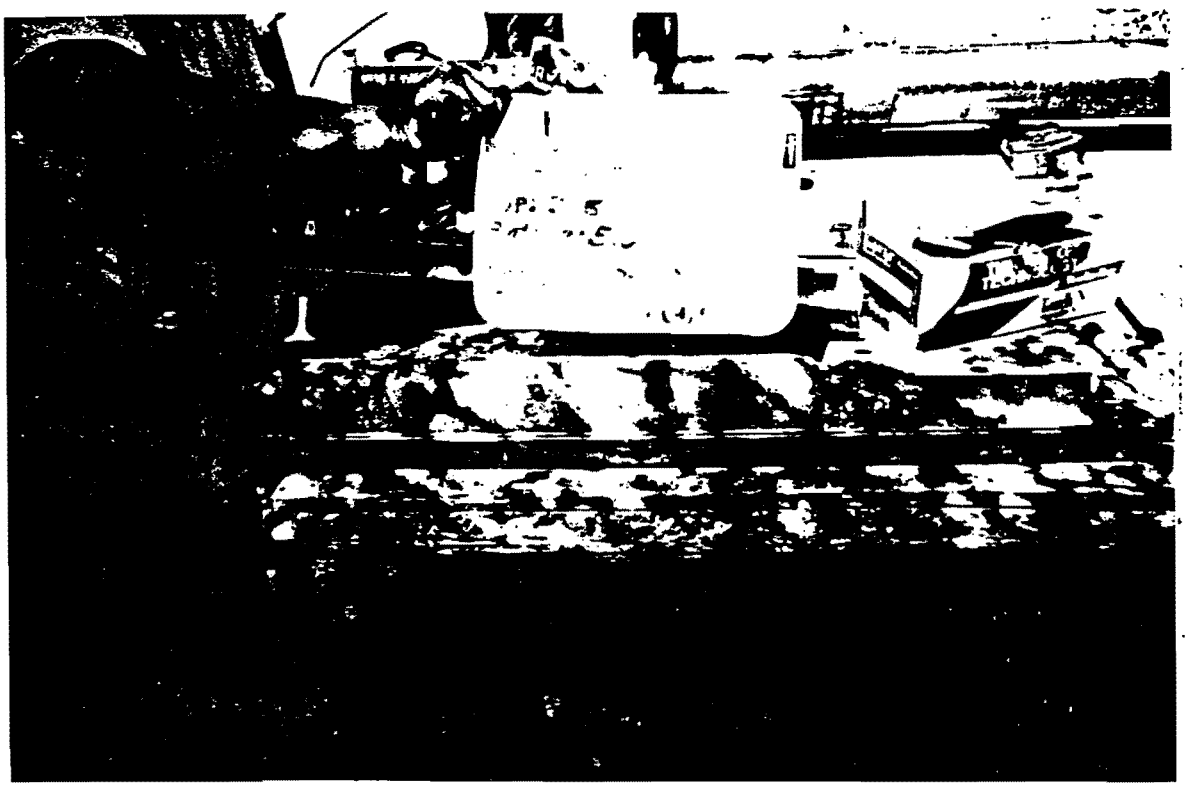
Location 02- 01239
PRS 02- 011(b)
Top: 11.0' Bottom: 12.5'

PRS 02- 011(b)
Top: 12.5' Bottom: 15.0'

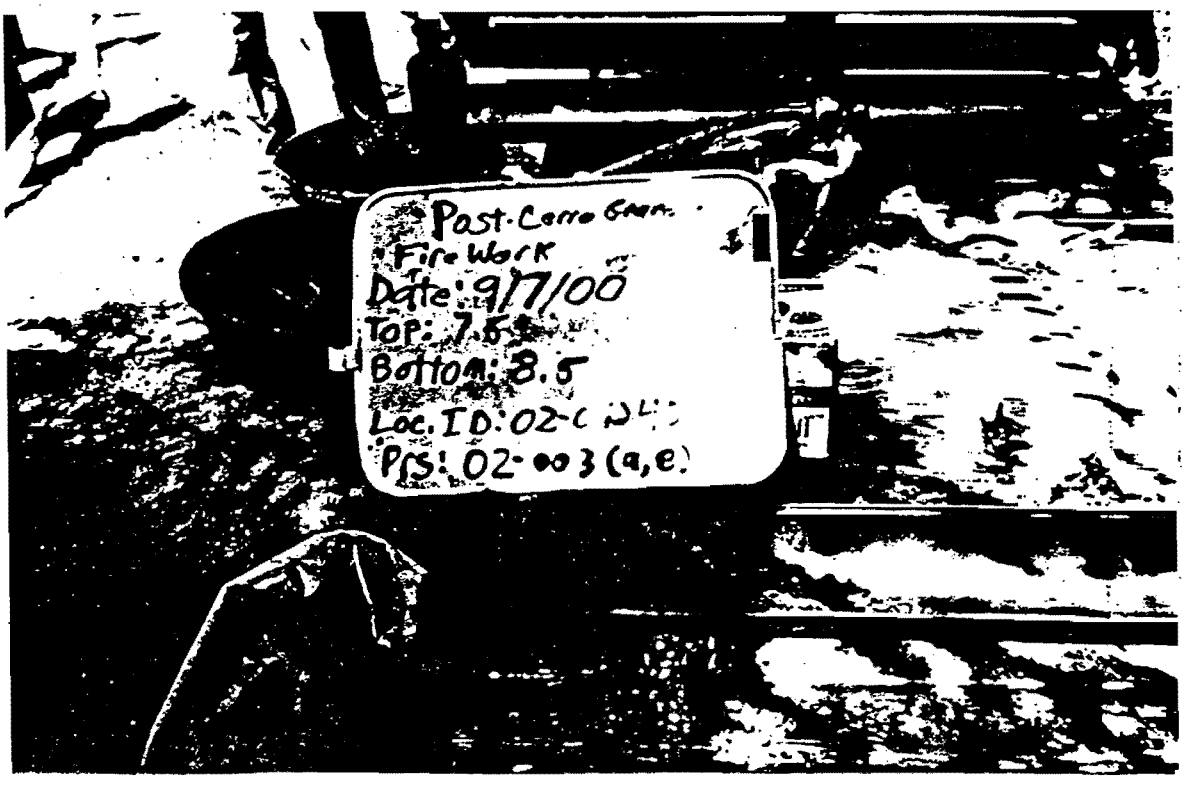
Location 02- 01240
PRS 02- 003(a,e)
Top: 0.0 Bottom: 2.5'



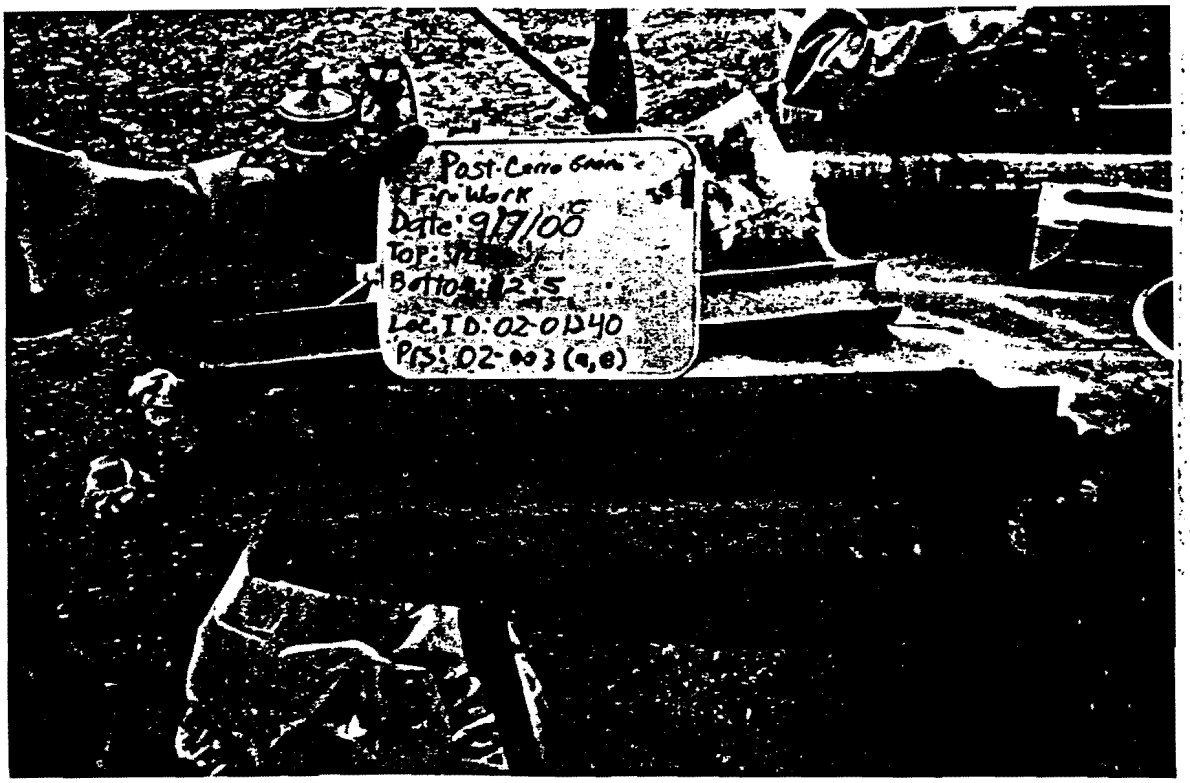
PRS 02- 003(a,e)
Top: 2.5' Bottom: 5.0'



Location 02- 01240
PRS 02- 003(a,e)
Top: 7.5' Bottom: 8.5'

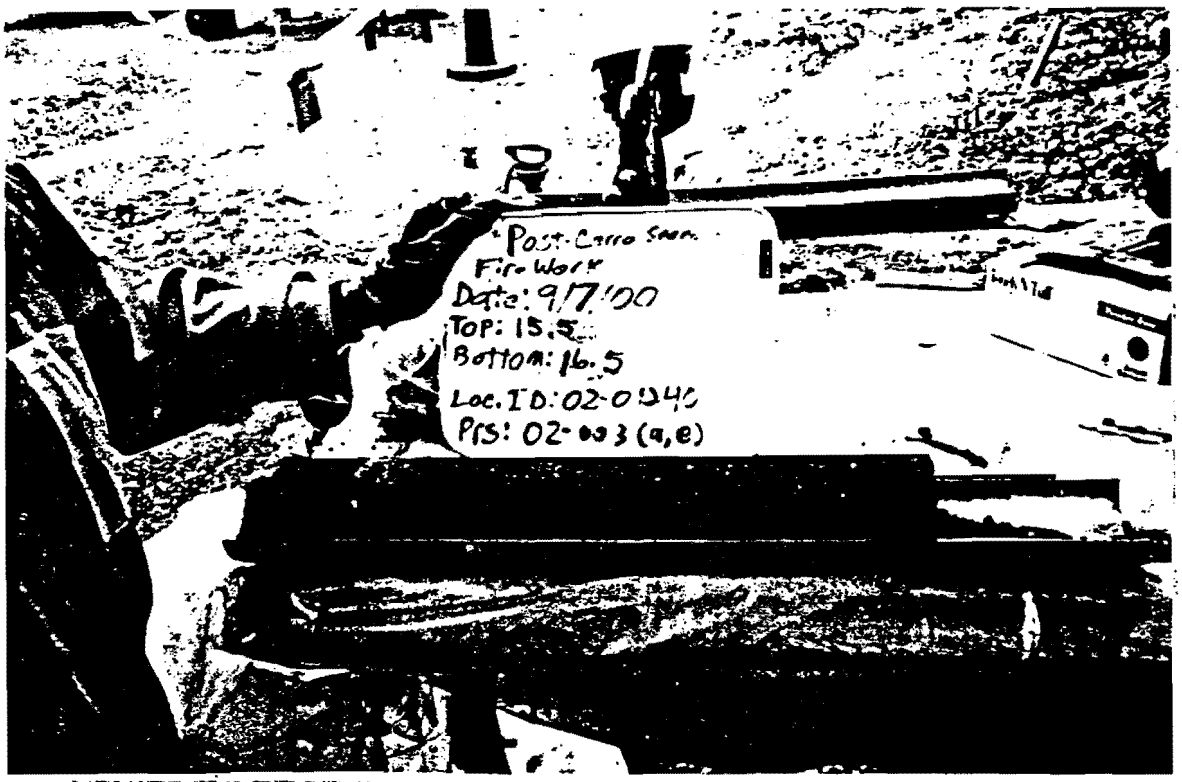


PRS 02- 003(a,e)
Top: 10.0' Bottom: 12.5'

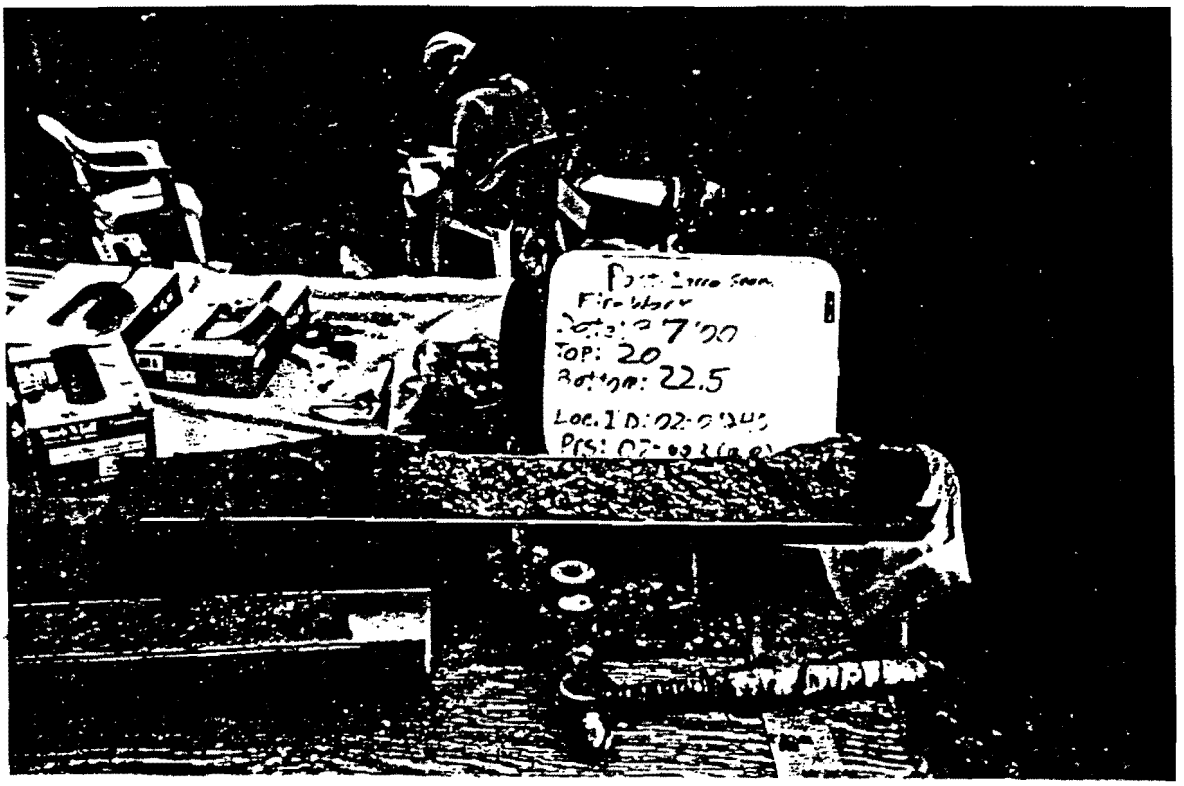


Location 02- 01240
PRS 02- 003(a,e)
Top: 12.5' Bottom: 15.0'

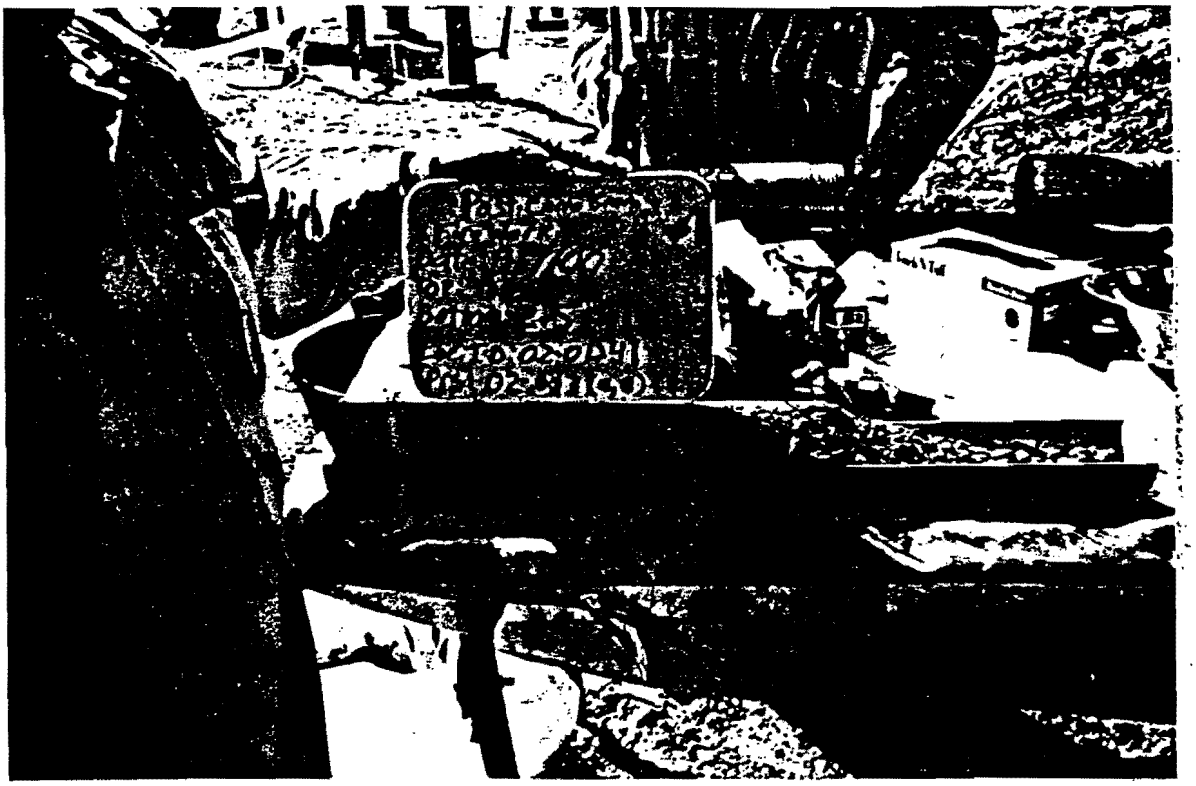
PRS 02- 003(a,e)
Top: 15.5' Bottom: 16.5'



Location 02- 01240
PRS 02- 003(a,e)
Top: 20.0' Bottom: 22.5'



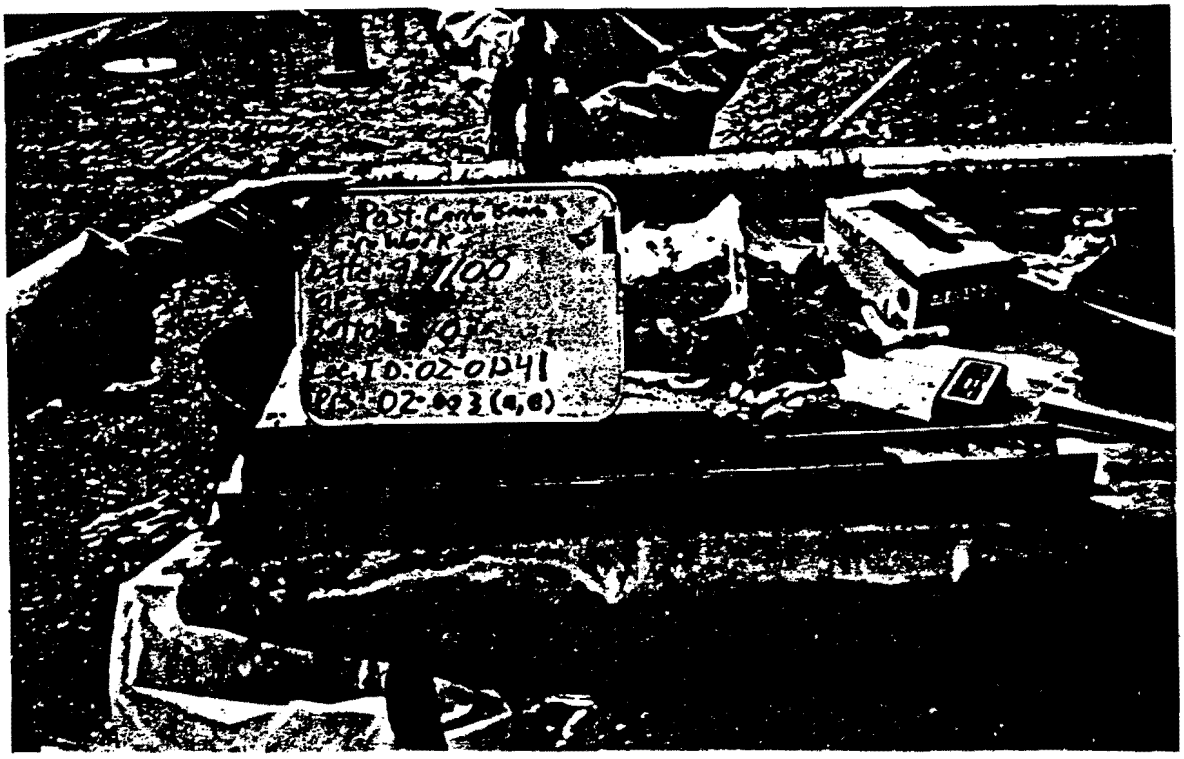
PRS 02- 003(a,e)
Top: 0.0 Bottom: 2.5'



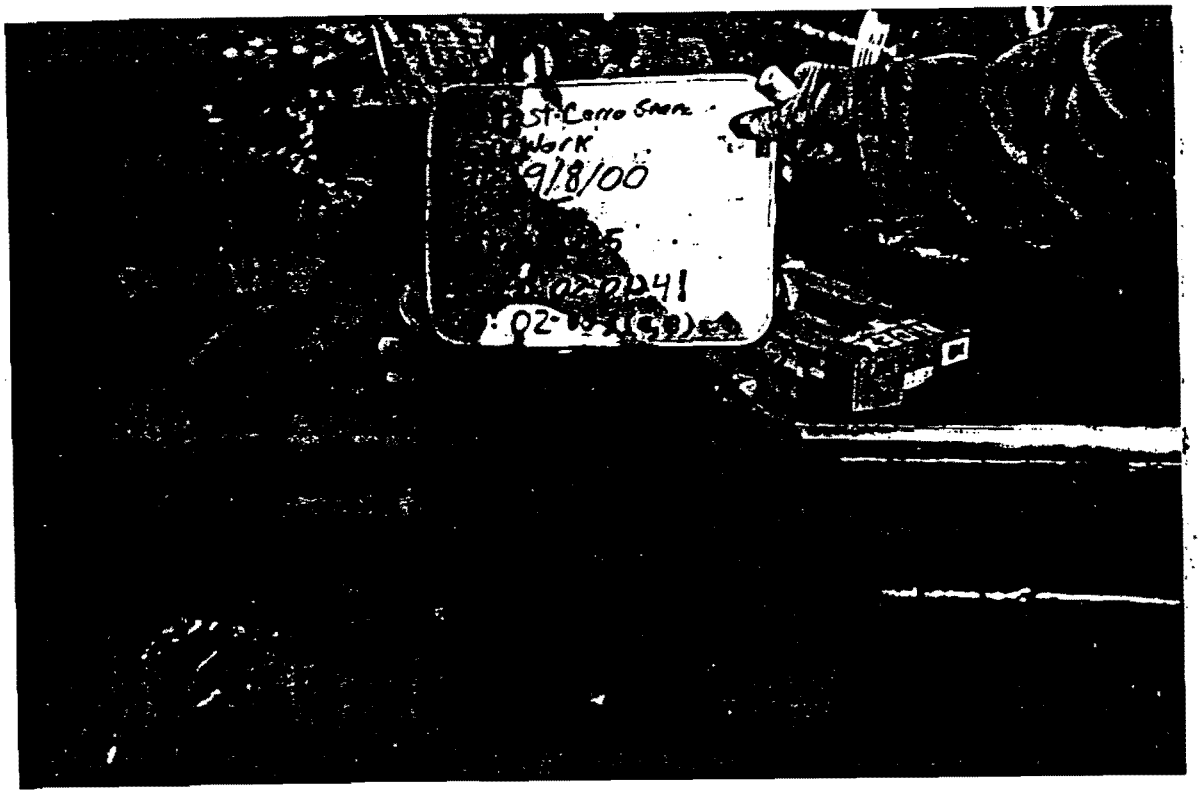
Location 02- 01241
PRS 02- 003(a,e)
Top: 2.5' Bottom: 5.0'

Section 02- 0121
PRS 02- 003(a,e)
Top: 5.0' Bottom: 7.5'

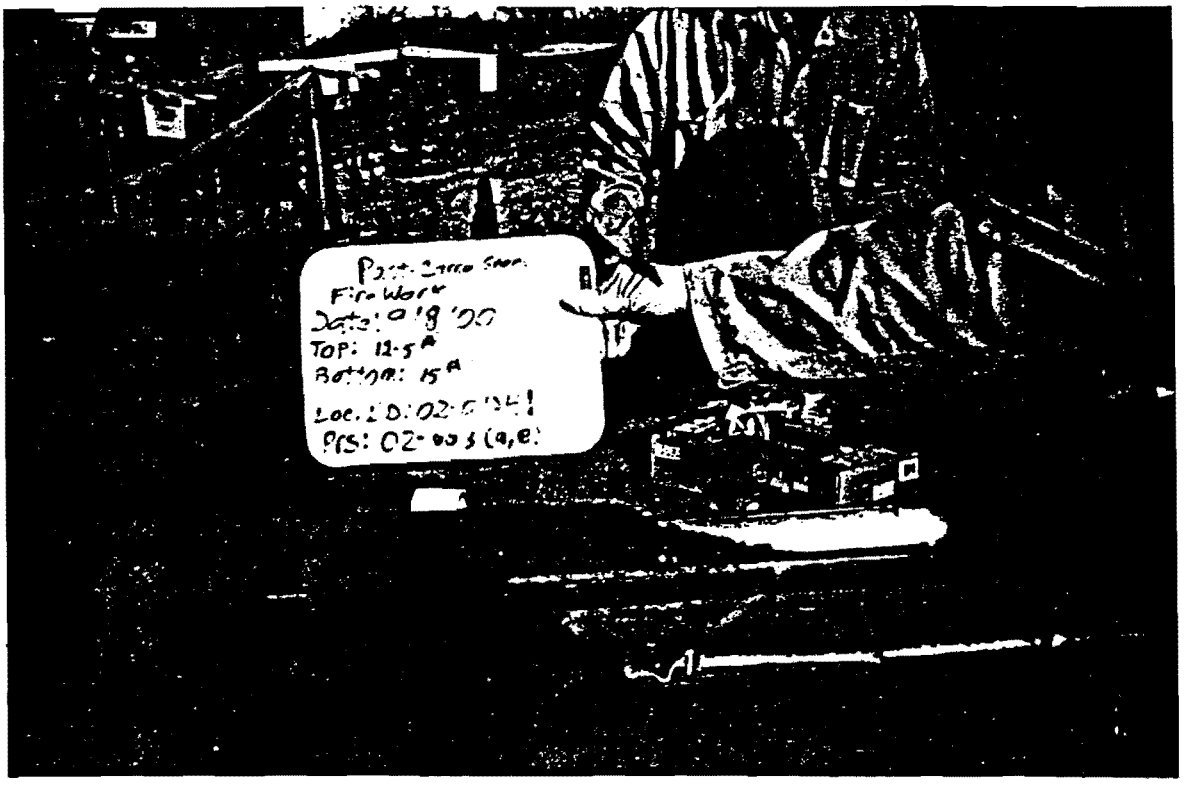
Location 02- 01241
PRS 02- 003(a,e)
Top: 7.5' Bottom: 10.0'



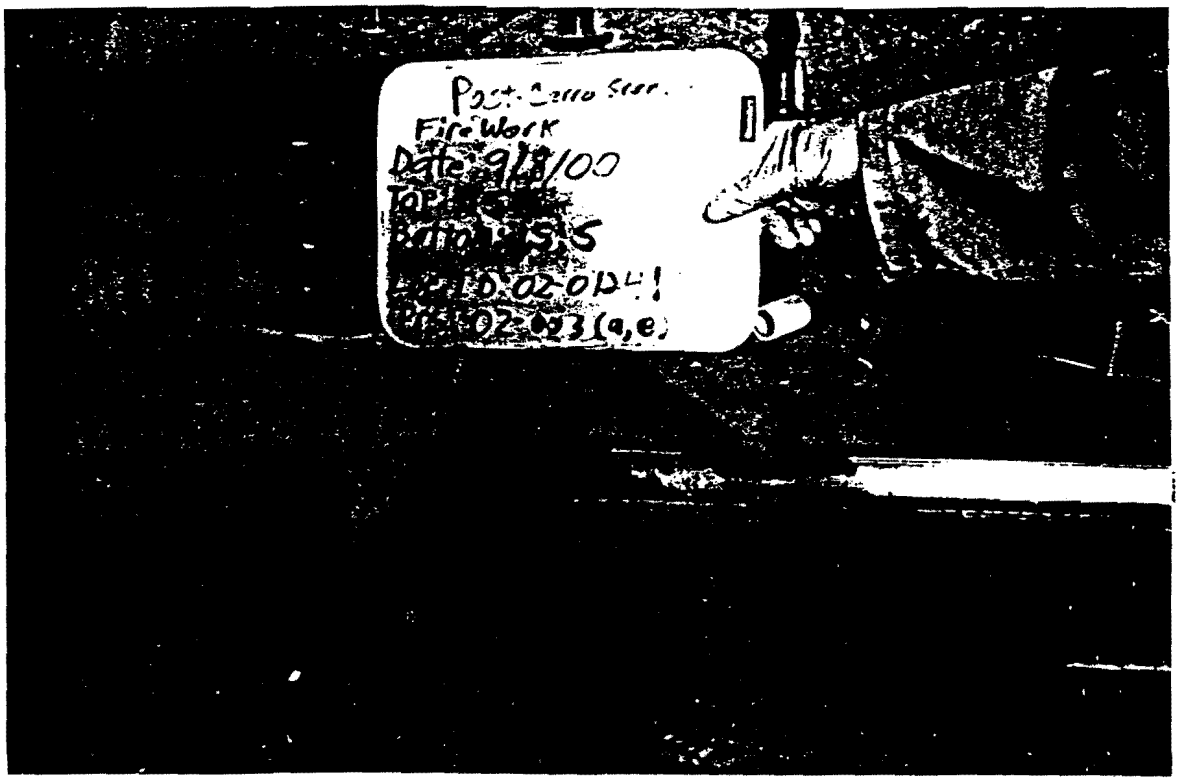
PRS 02- 003(a,e)
Top: 11.5' Bottom: 12.5'



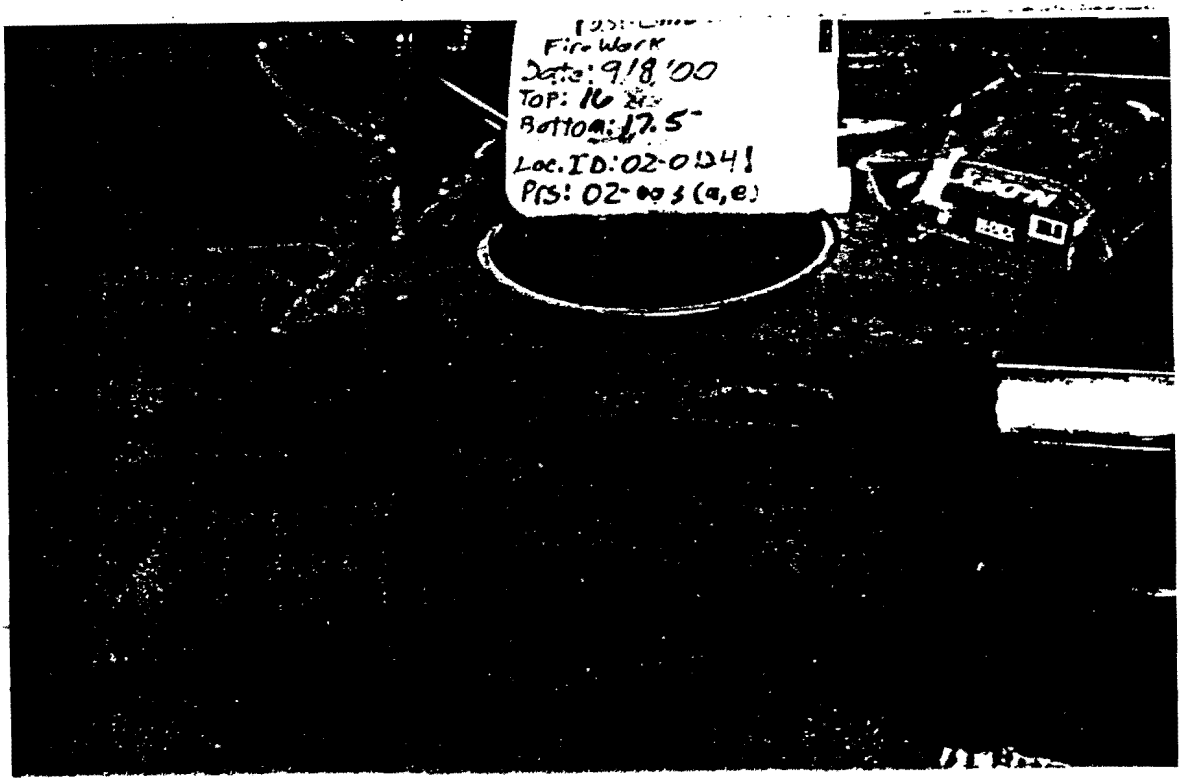
Location 02- 01241
PRS 02- 003(a,e)
Top: 12.5' Bottom: 15.0'



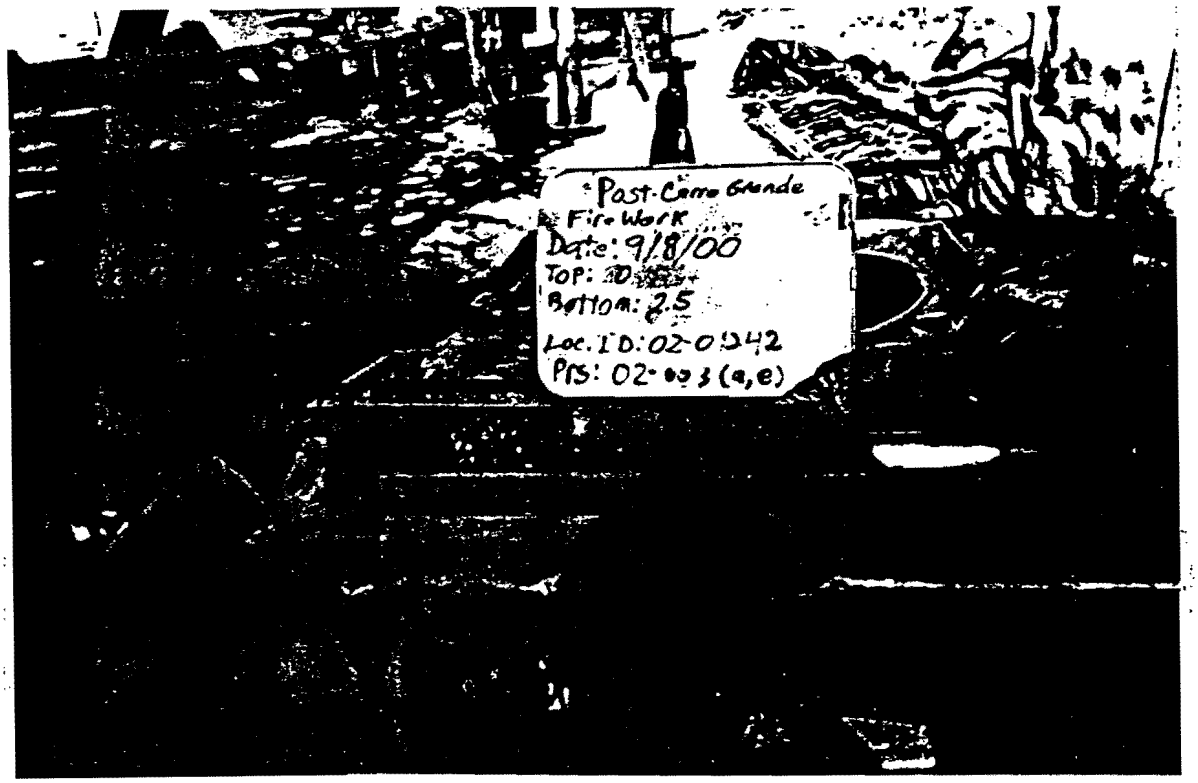
Location 02- 01241
PRS 02- 003(a,e)
Top: 15.0' Bottom: 15.5'



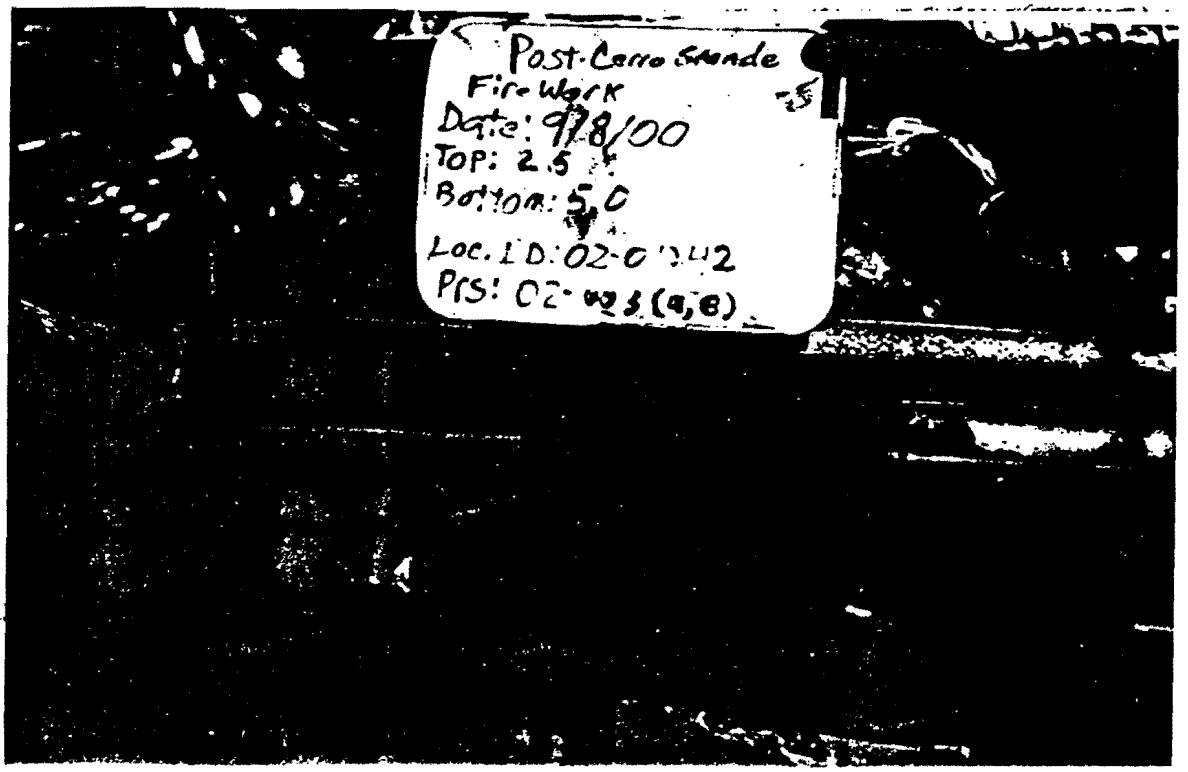
Location 02- 01241
PRS 02- 003(a,e)
Top: 16.0' Bottom: 17.5'



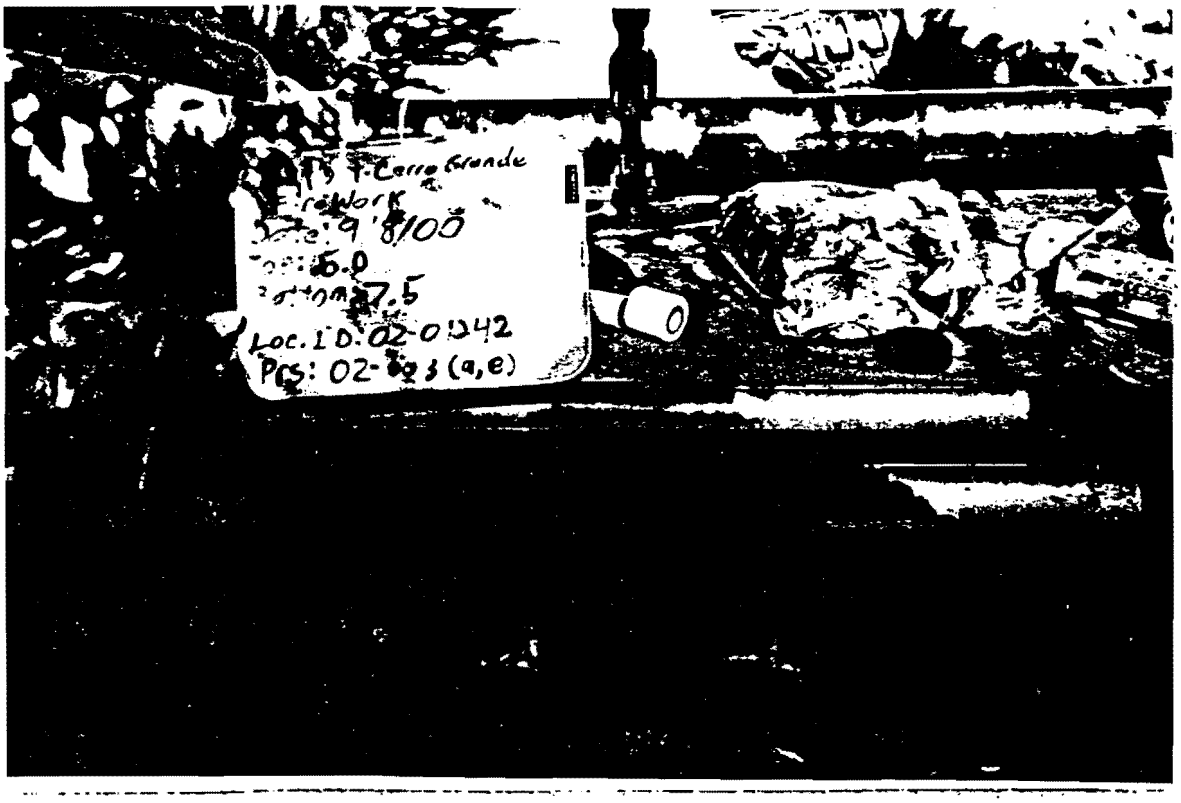
PRS 02- 003(a,e)
Top: 0.0 Bottom: 2.5'



Location 02- 01242
PRS 02- 003(a,e)
Top: 2.5' Bottom: 5.0'

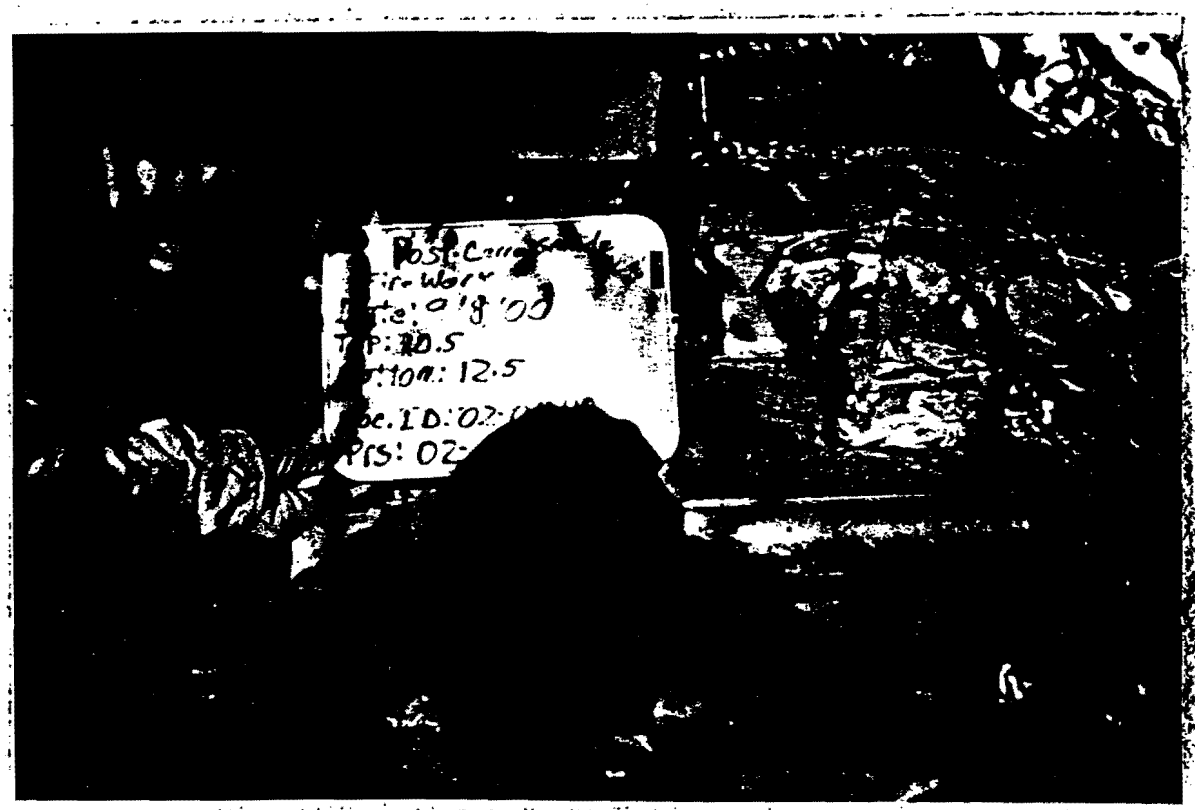


PRS 02- 003(a,e)
Top: 5.0' Bottom: 7.5'



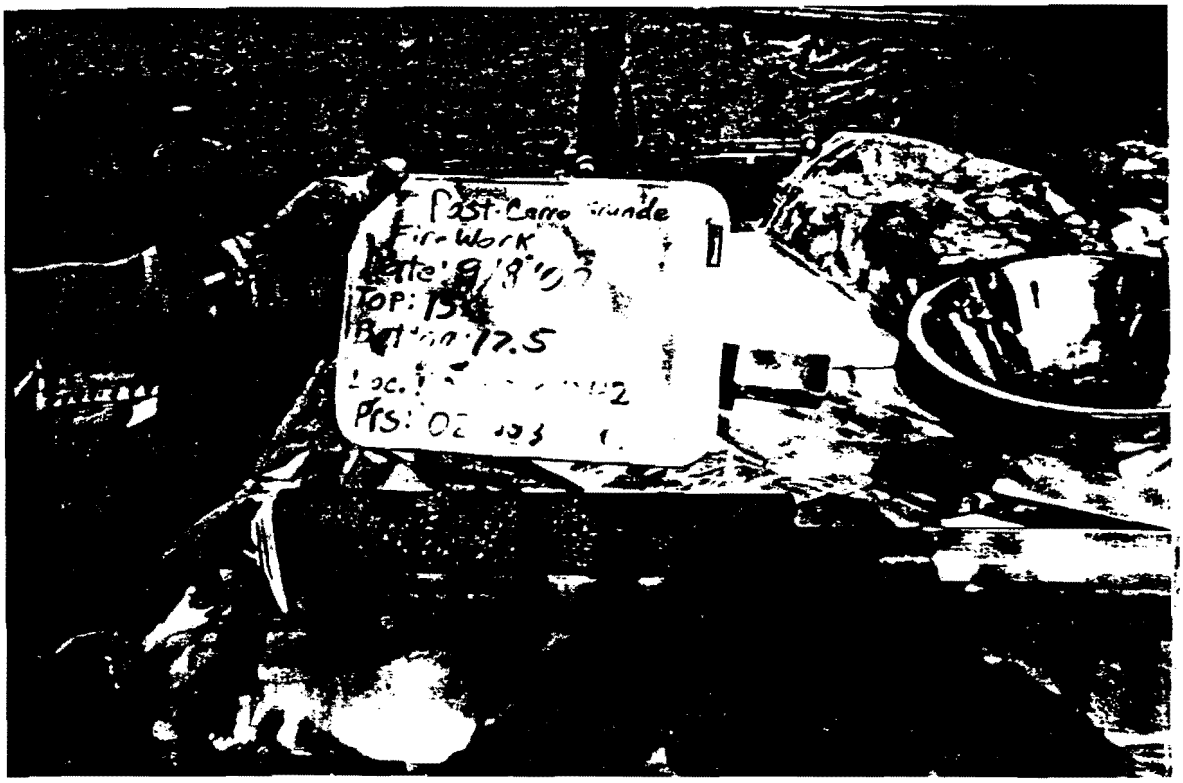
Location 02- 01242
PRS 02- 003(a,e)
Top: 7.5' Bottom: 10.0'

Location 02- 01242
PRS 02- 003(a,e)
Top: 10.5' Bottom: 12.5'

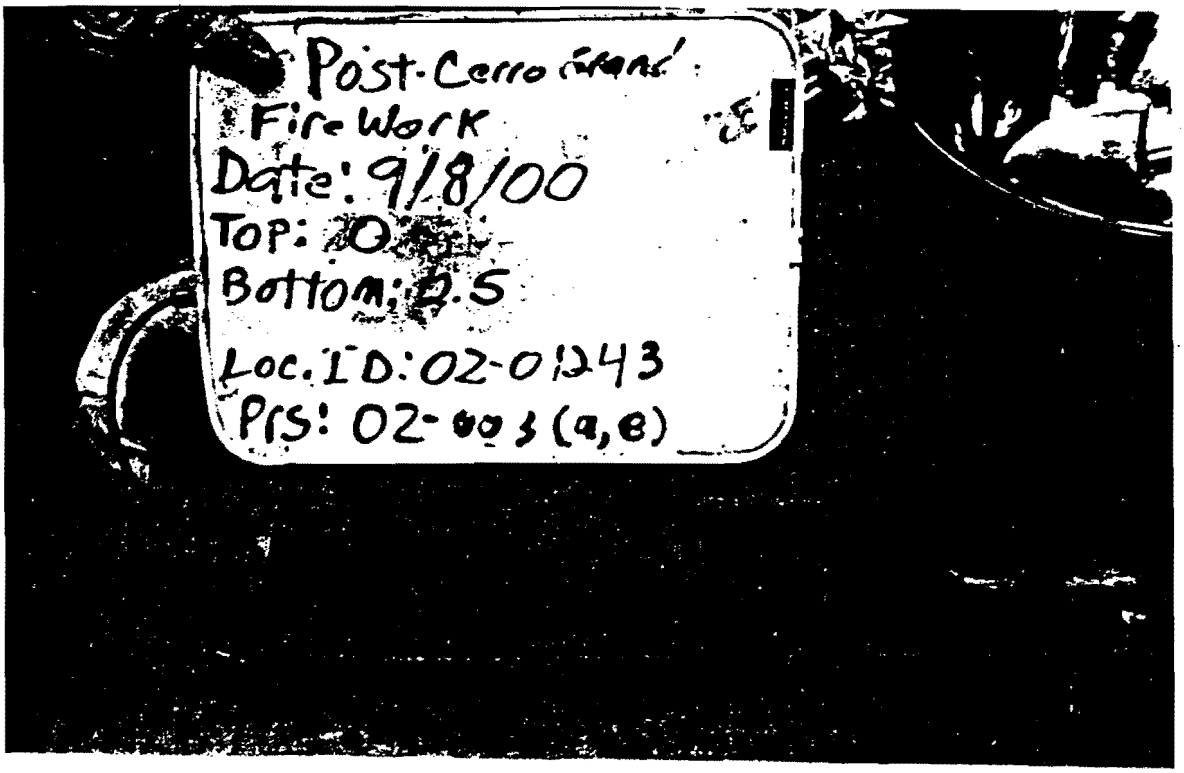


Location 02- 01242
PRS 02- 003(a,e)
Top: 12.5' Bottom: 14.5'

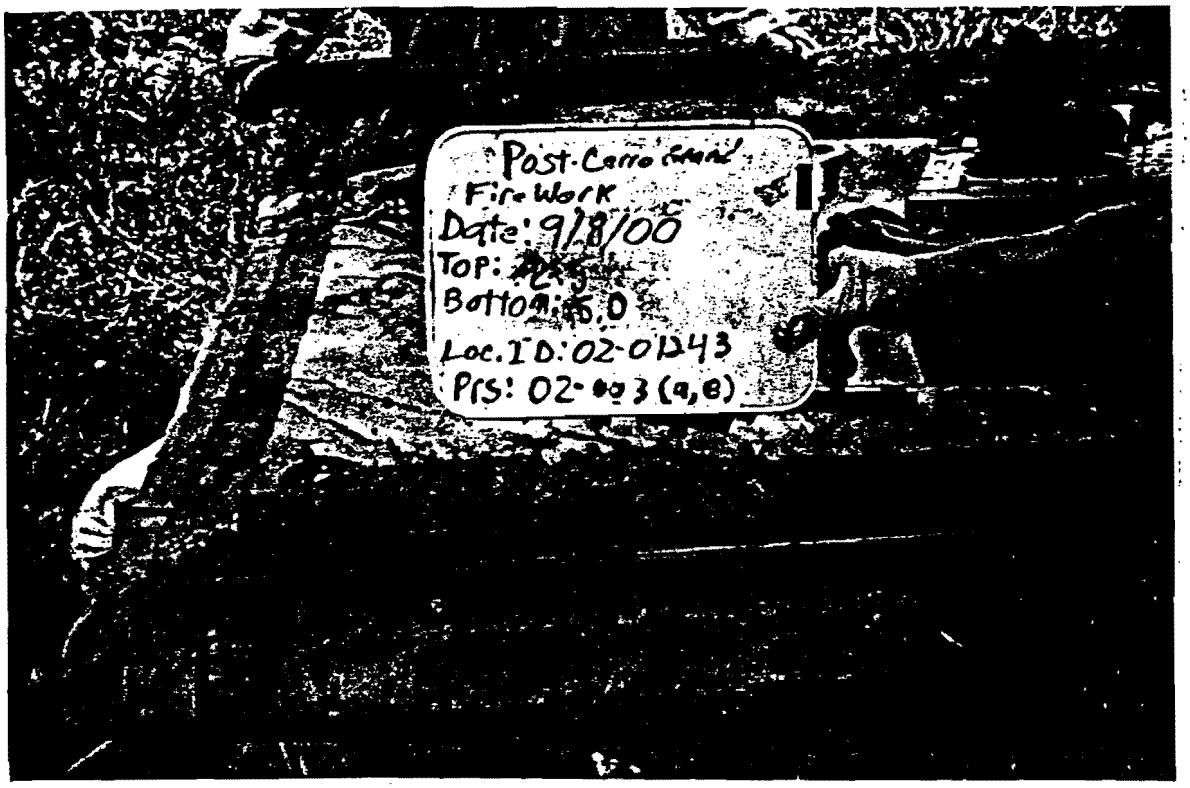
PRS 02- 003(a,e)
Top: 15.0' Bottom: 17.5'



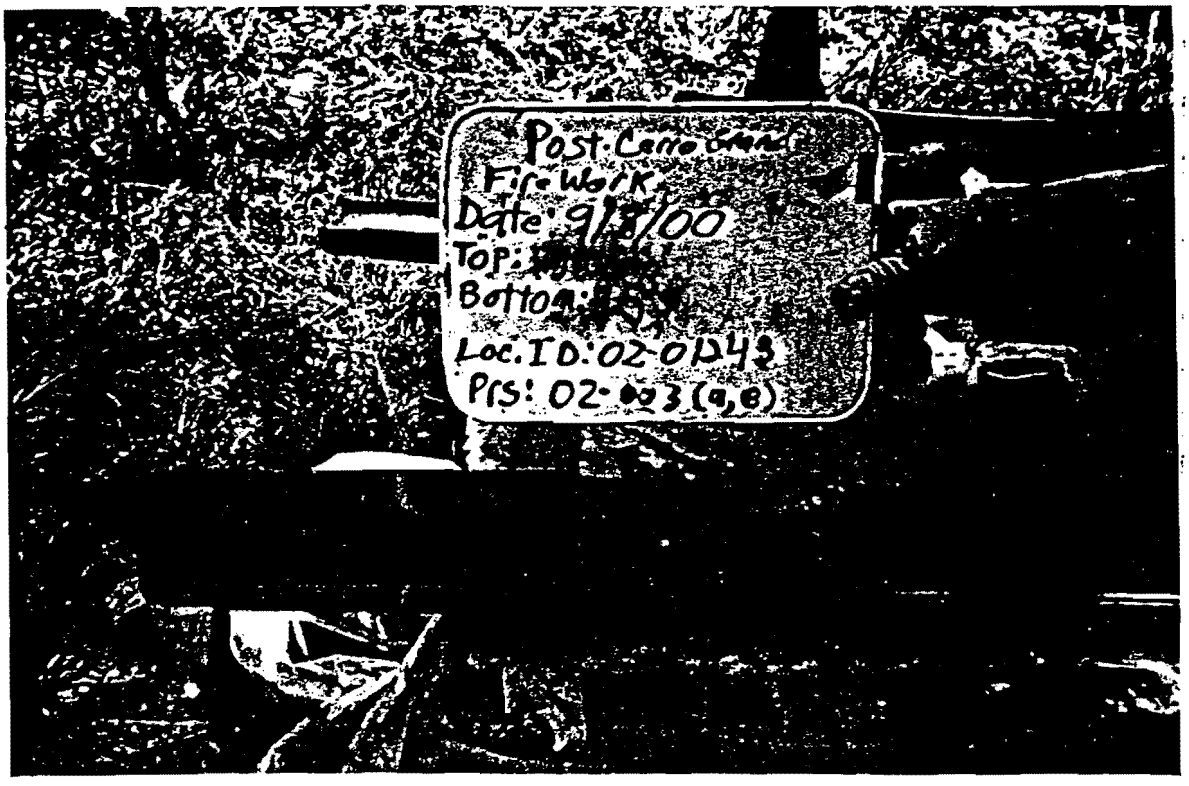
Location 02- 01243
PRS 02- 003(a,e)
Top: 0.0 Bottom: 2.5'



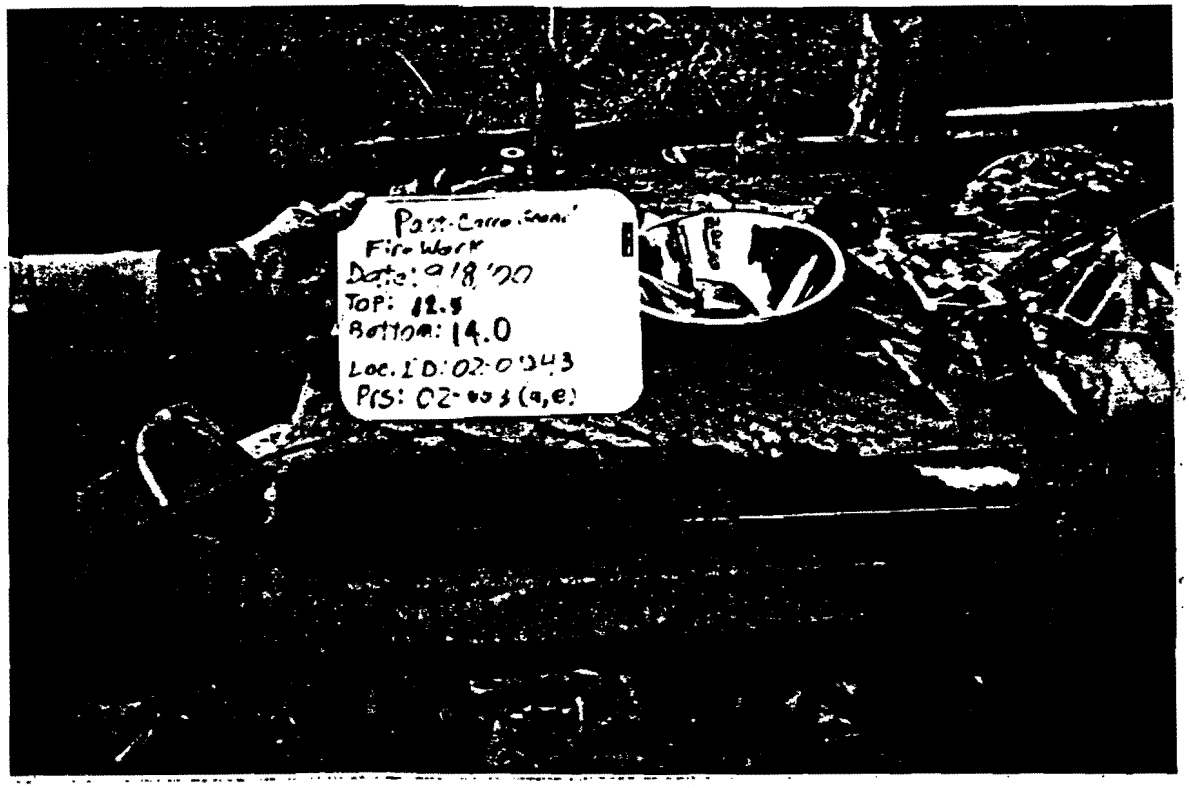
PRS 02- 003(a,e)
Top: 2.5' Bottom: 5.0'



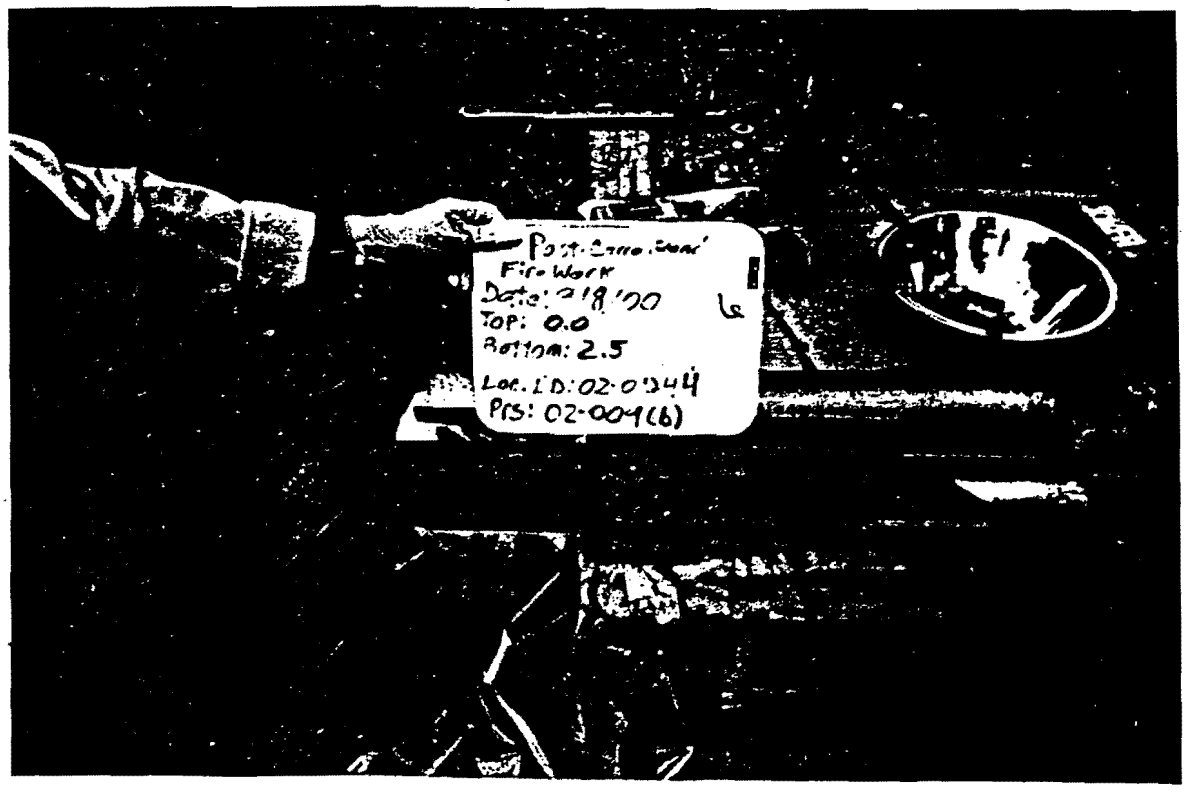
Location 02- 0243
PRS 02- 003(a,e)
Top: 5.0' Bottom: 7.5'



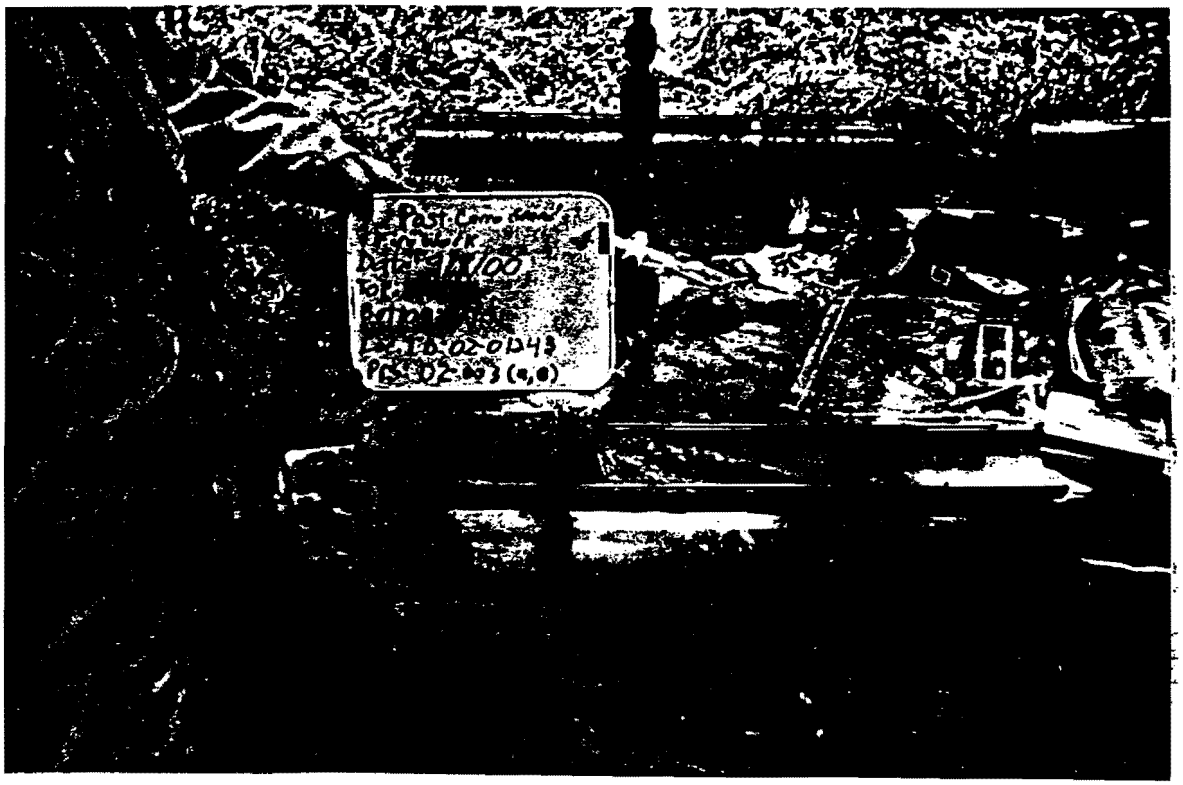
PRS 02- 0036(a,e)
Top: 12.5' Bottom: 14.0'



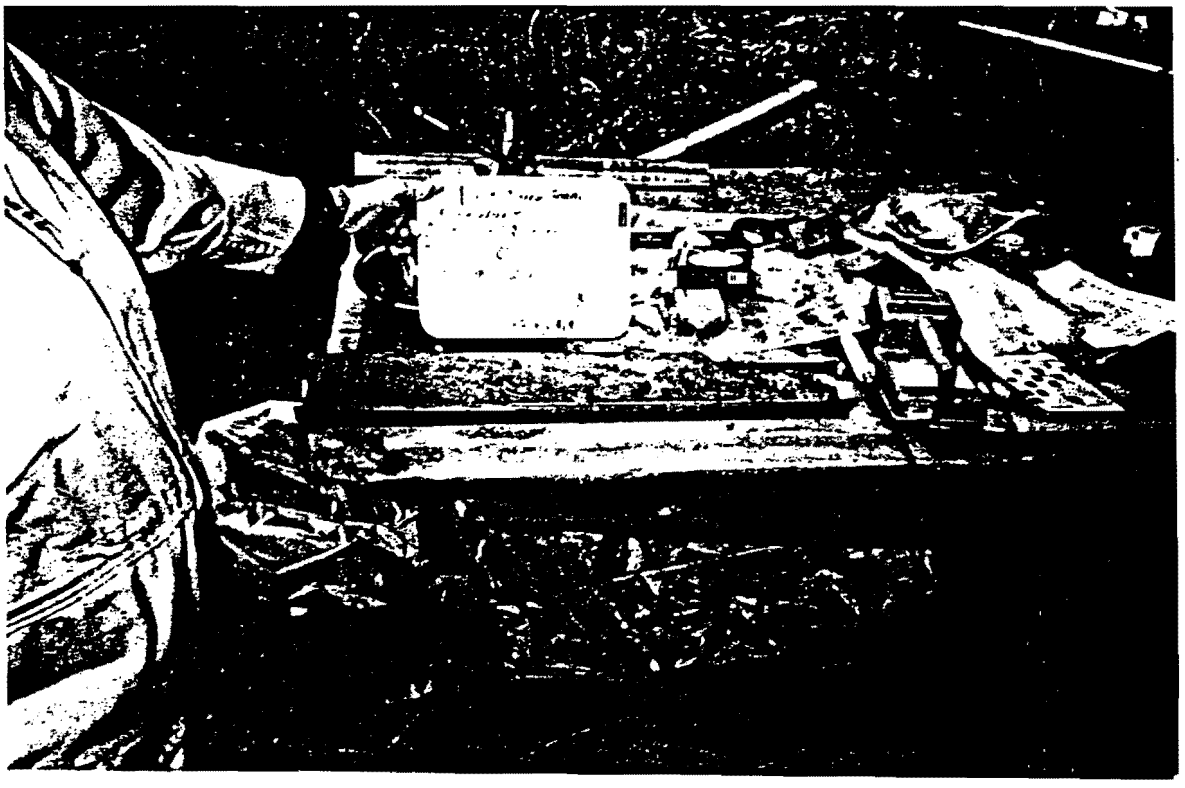
Location 02- 01244
PRS 02- 009(b)
Top: 0.0 Bottom: 2.5'



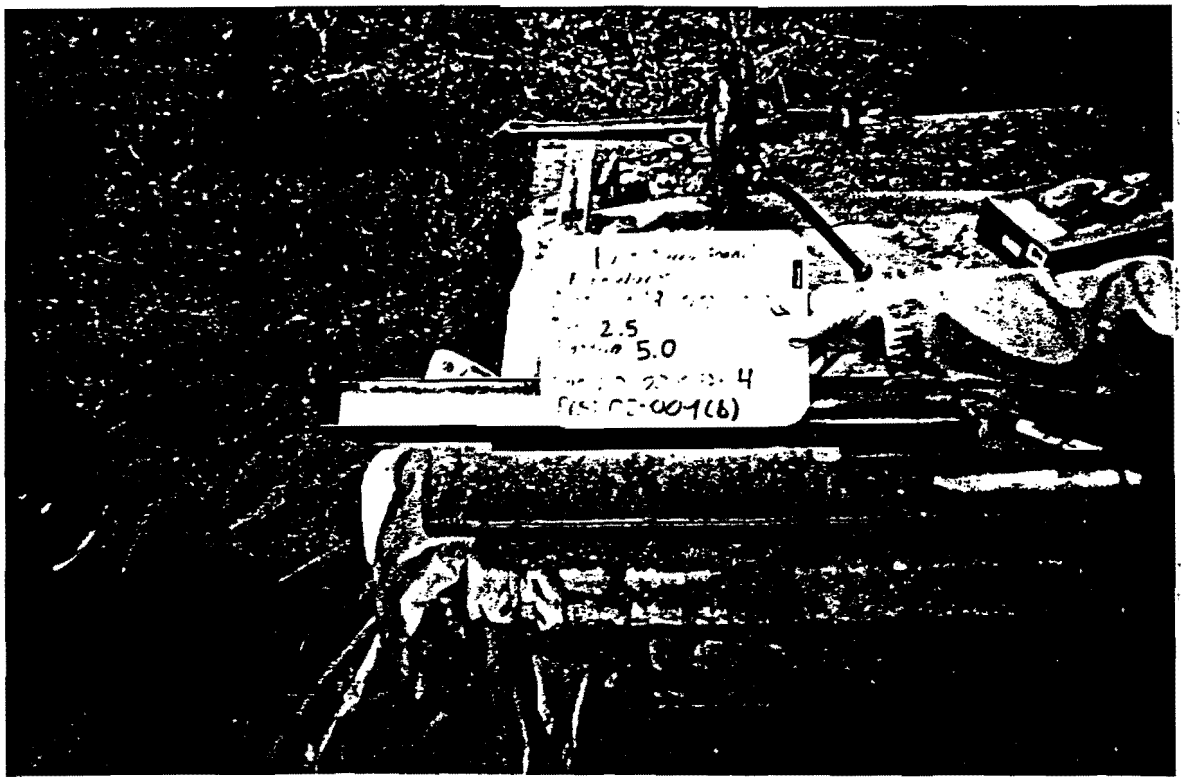
PRS 02- 003(a,e)
Top: 7.5' Bottom: 9.0'



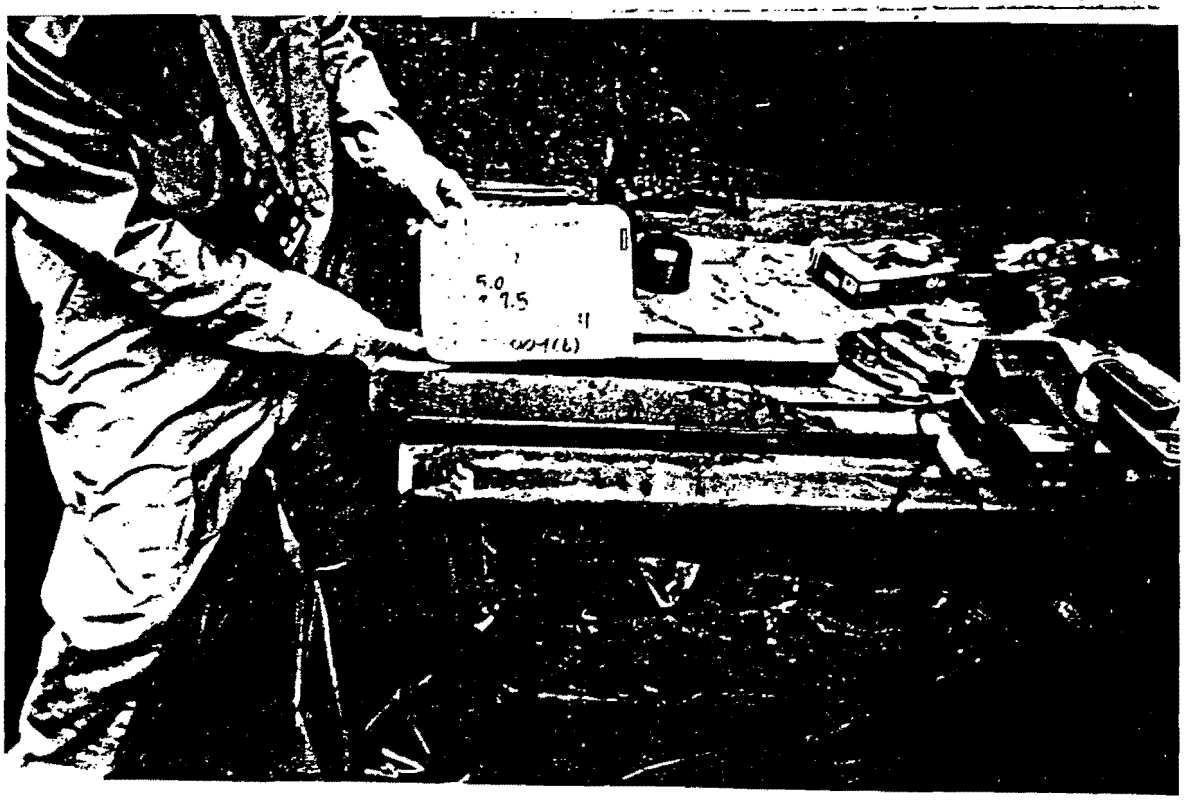
Location 02- 01243
PRS 02- 003(a,e)
Top: 10.0' Bottom: 12.5'



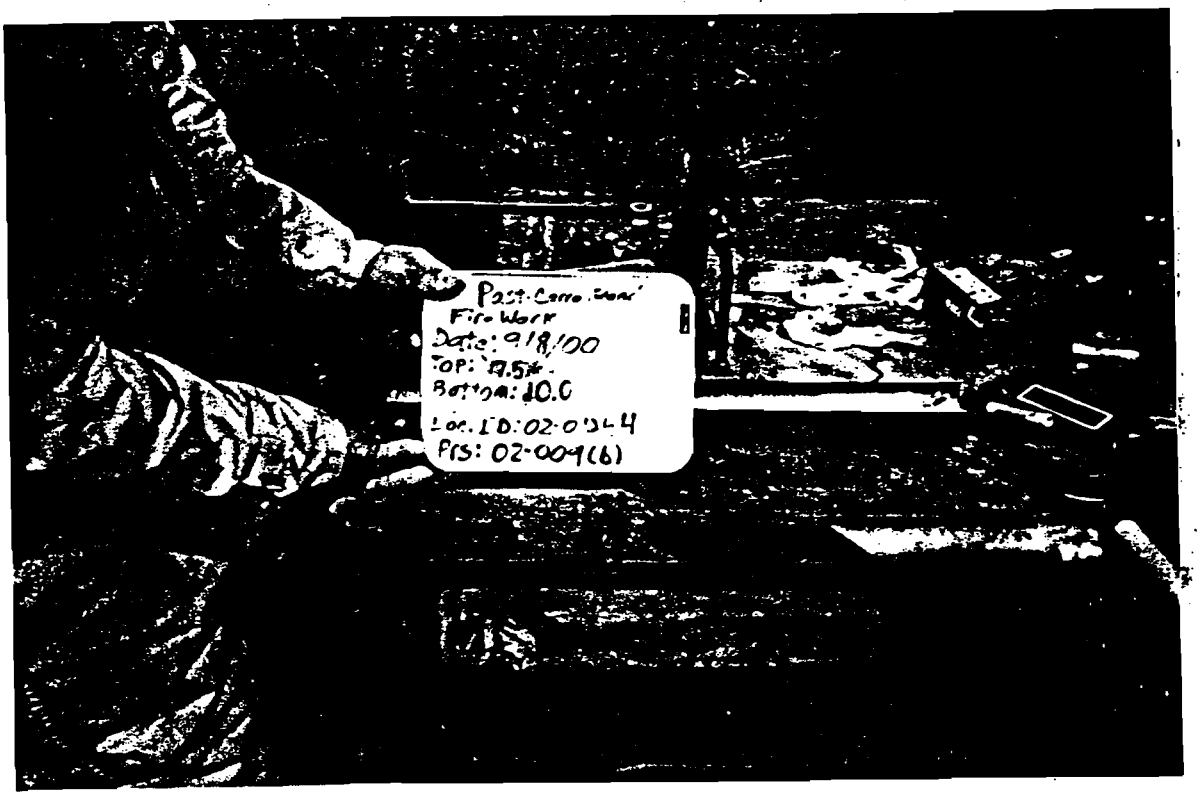
Top: 2.5' Bottom: 5.0'



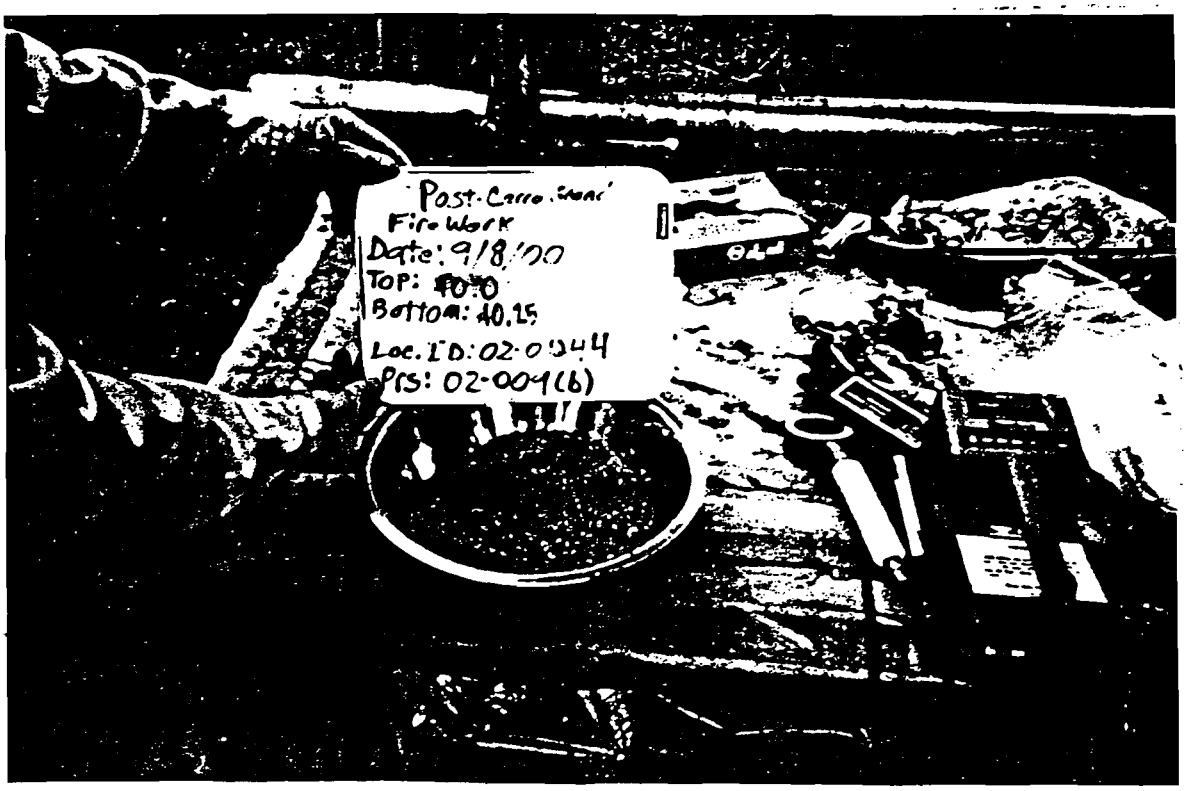
Location 02- 01244
PRS 02- 009(b)
Top: 5.0' Bottom: 7.5'



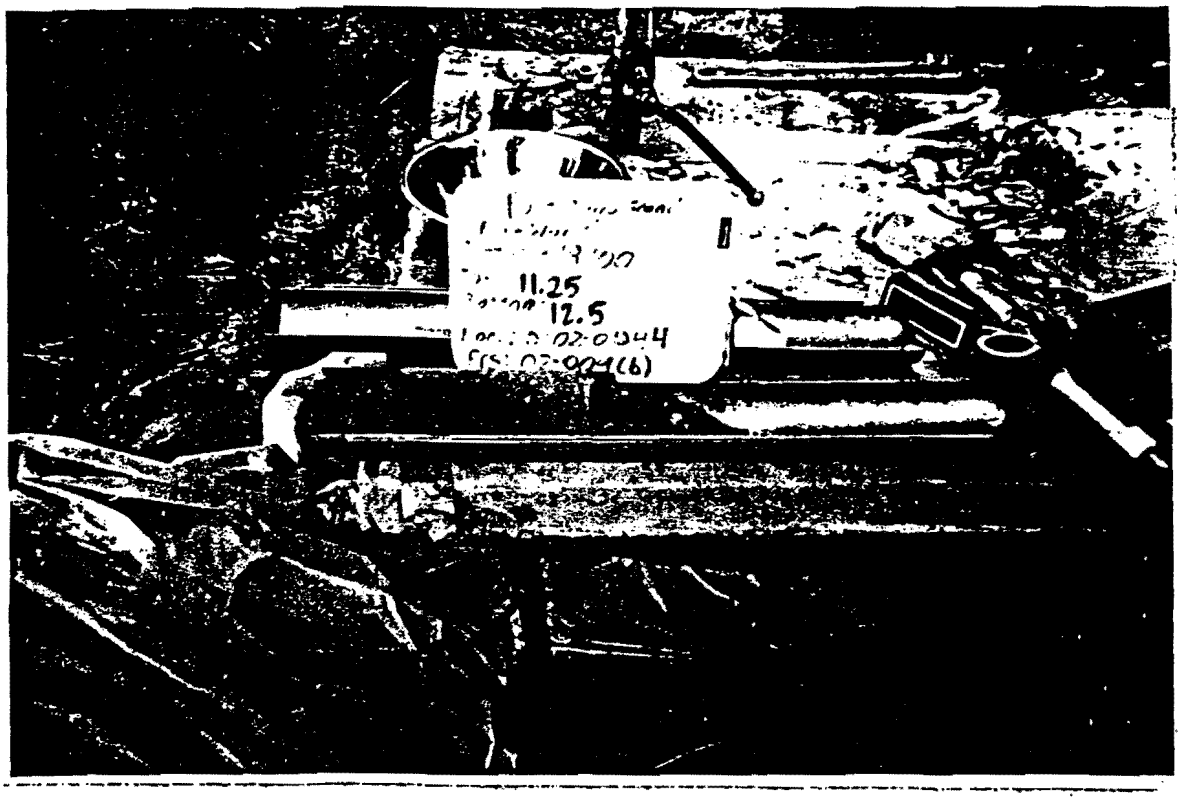
PRS 02-009(b)
Top: 7.5' Bottom: 10.0'



Location 02-01244
PRS 02-009(b)
Top: 10.0' Bottom: 10.25'



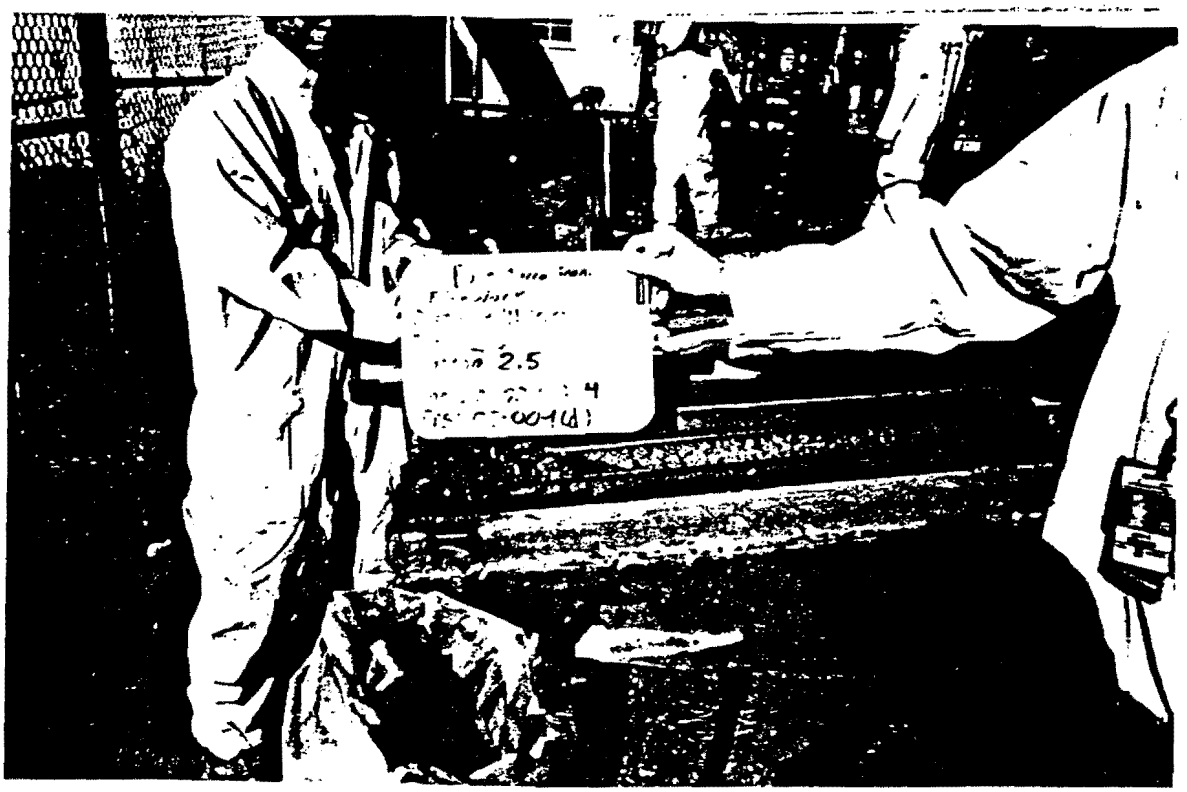
PRS 02-009(b)
Top: 11.25' Bottom: 12.5'



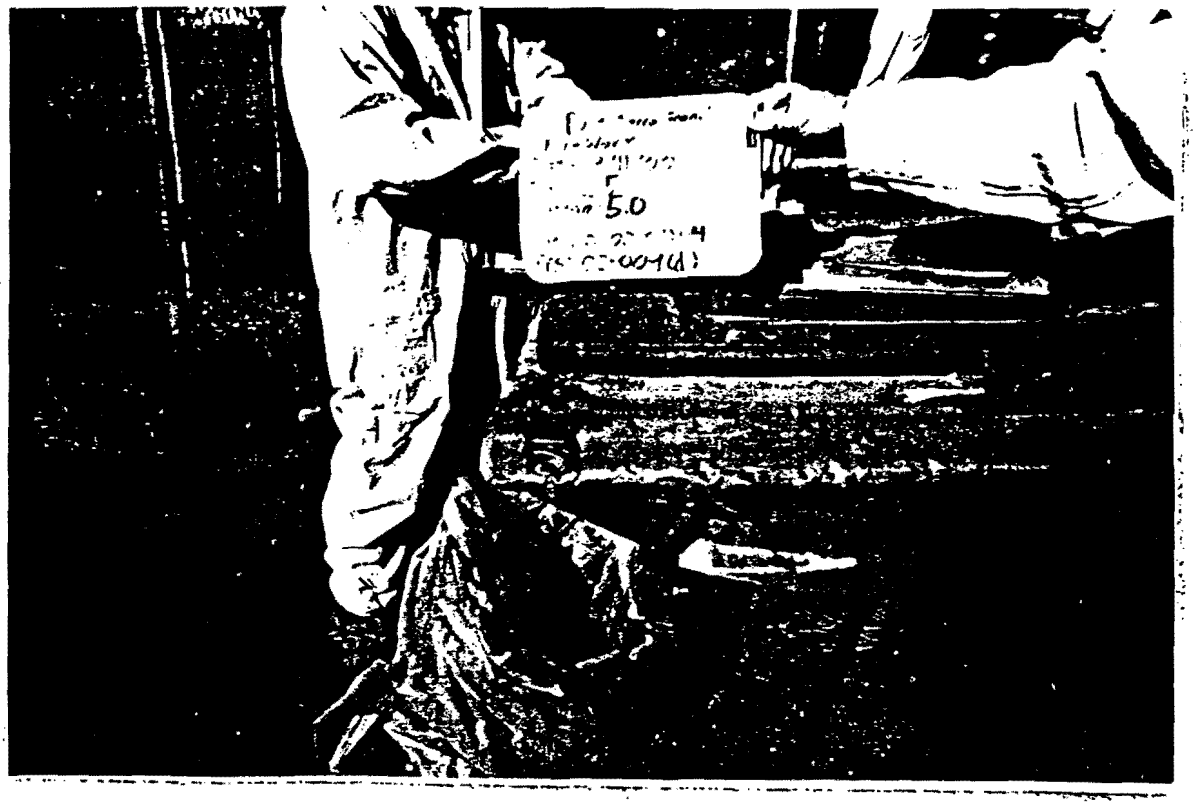
Location 02-01244
PRS 02-009(b)
Top: 12.5' Bottom: 15.0'

Location 02- [illegible]
PRS 02- 009(b)
Top: 12.5' Bottom: 15.0'

Location 02- 01245
PRS 02- 009(d)
Top: 2.0' Bottom: 2.5'
Note: Loc. Id on board is wrong. for entire hole.



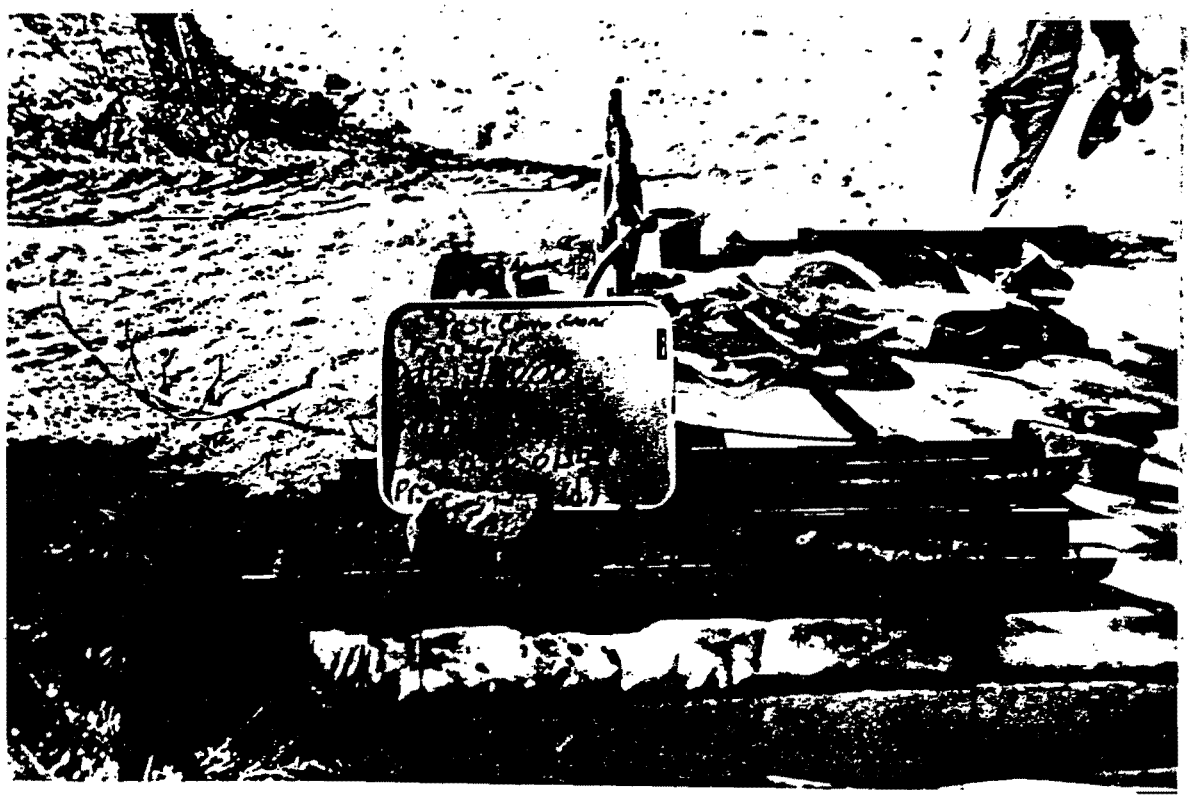
Top: 2.5' Bottom: 5.0'



Location 02- 01245
PRS 02- 009(d)
Top: 5.0' Bottom: 6.5'

PRS 02- 009(d)
Top: 7.5' Bottom: 10.0'

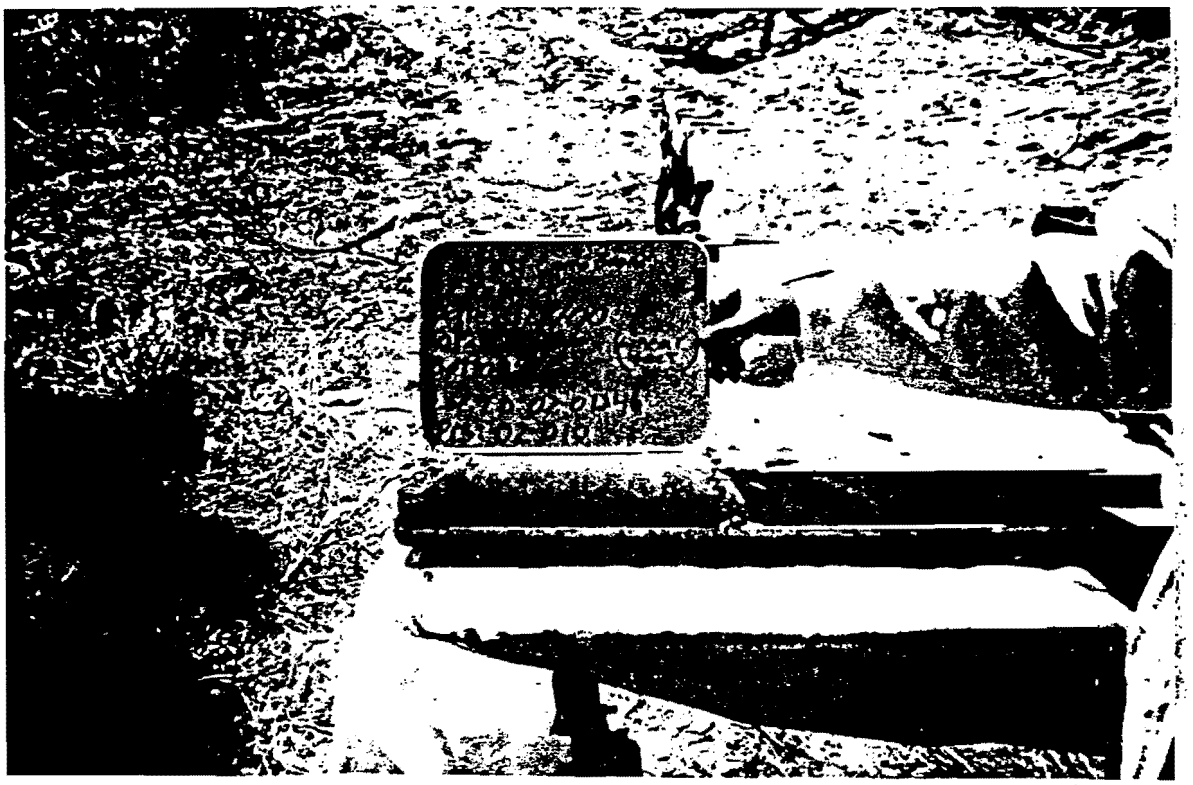
Location 02- 01245
PRS 02- 009(d)
Top: 10.5' Bottom: 11.5'



PRS 02- 009(d)
Top: 13.0' Bottom: 14.0'

Location 02- 01245
PRS 02- 009(d)
Top: 14.5' Bottom: 15.5'

Location 02- 01246
PRS 02- 010
Top: 0.0 Bottom: 2.5'

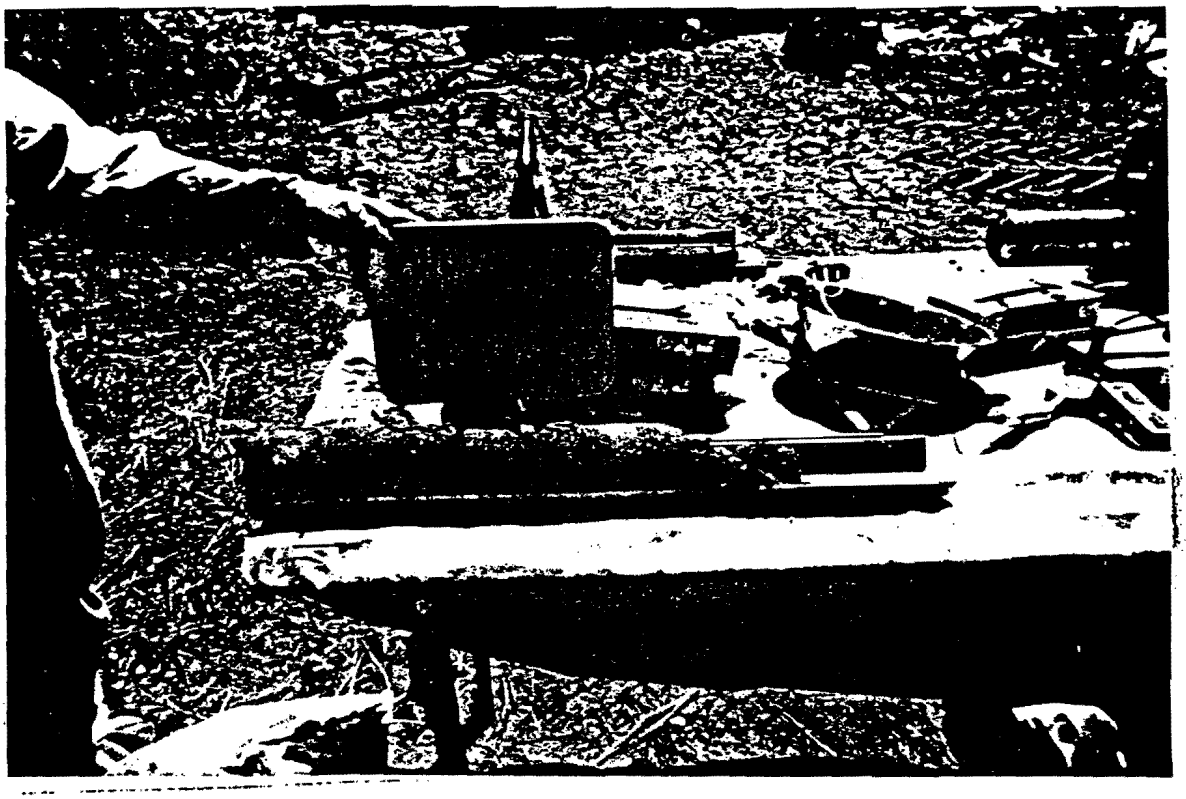


Location 02- 01246
PRS 02- 010
Top: 7.5' Bottom: 10.0'

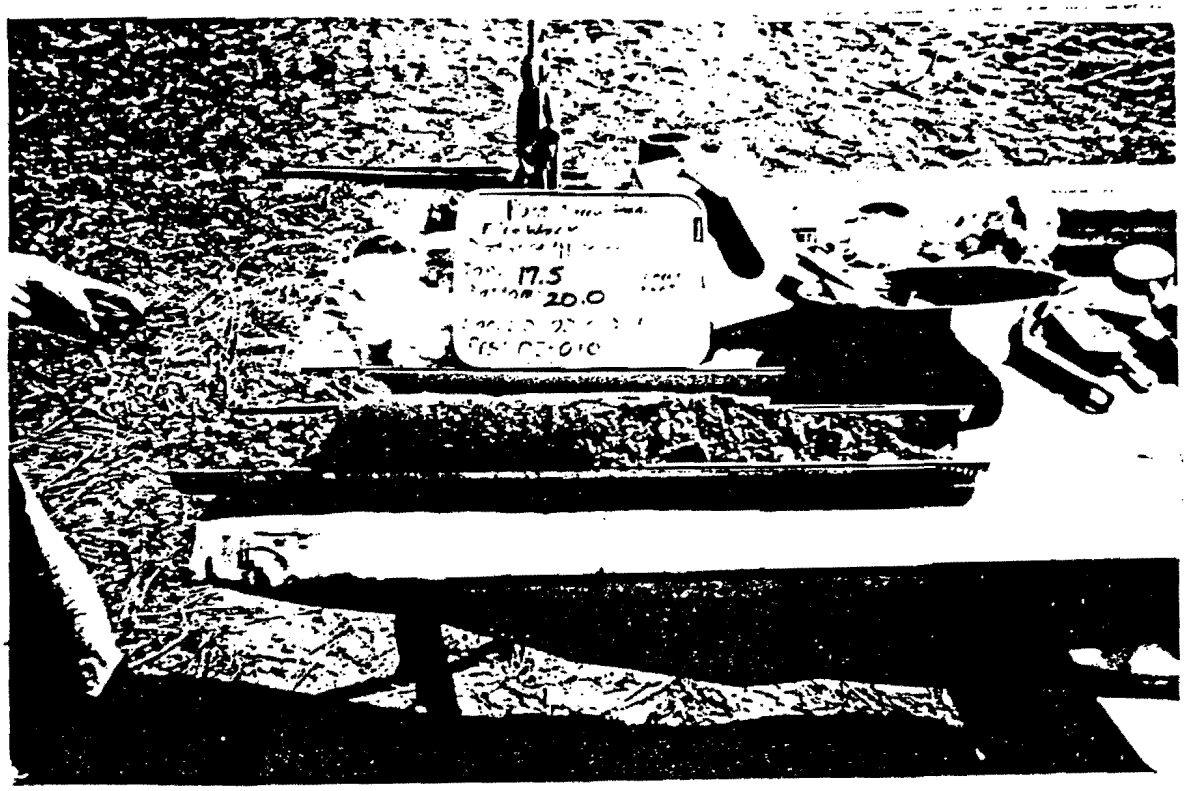
PRS 02- 010
Top: 10.0' Bottom: 12.5'

Location 02- 01246
PRS 02- 010
Top: 12.5' Bottom: 15.0'

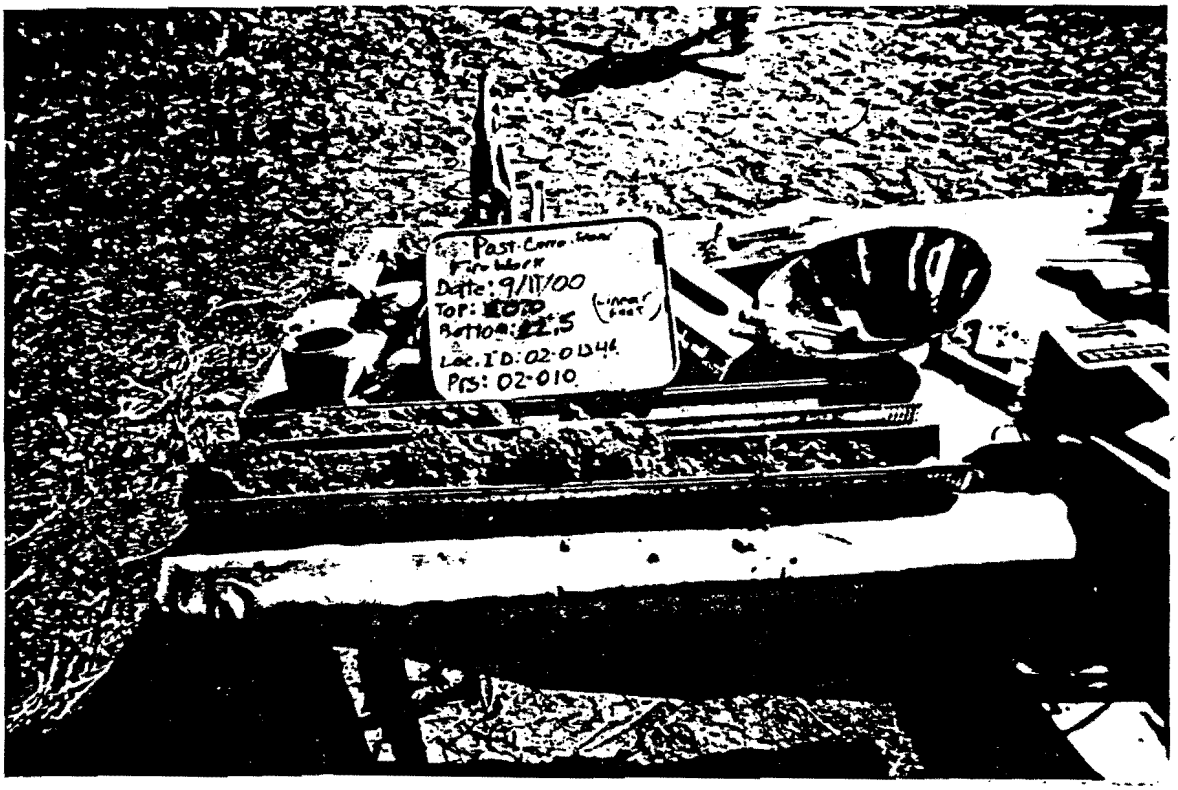
PRS 02- 010
Top: 12.5' Bottom: 15.0'



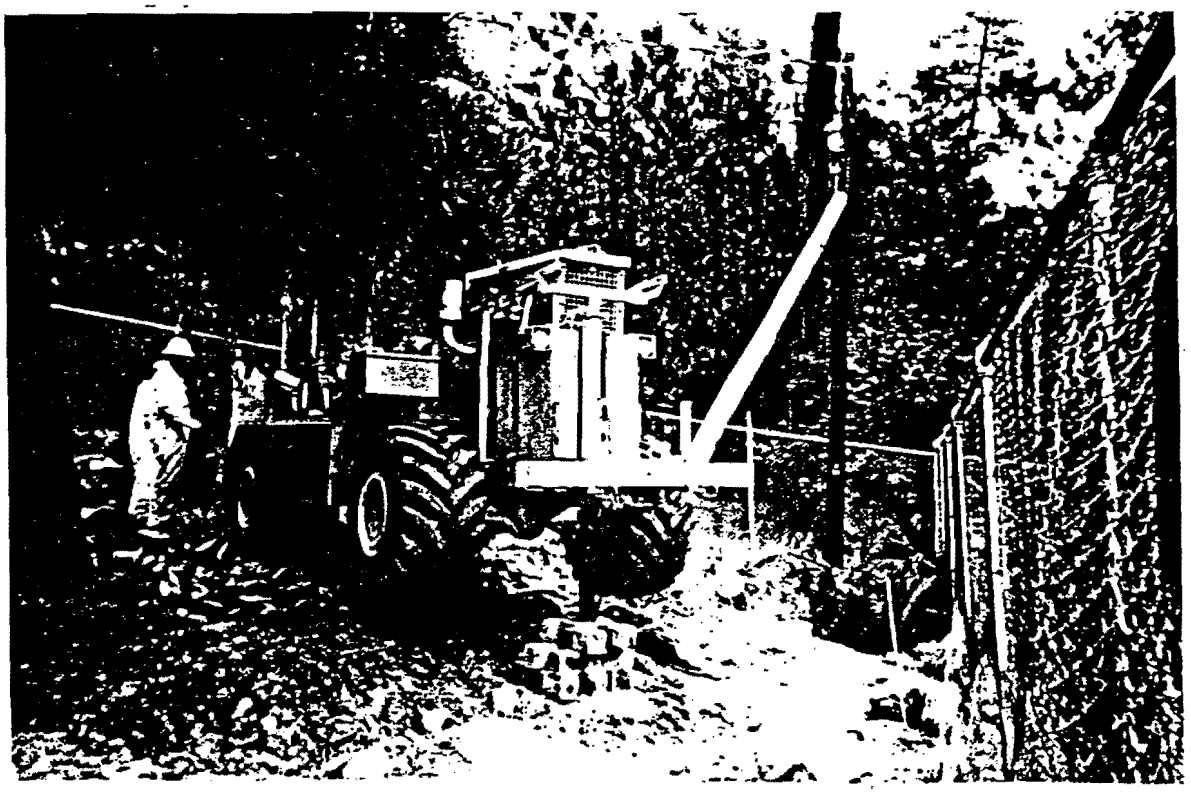
Location 02- 01246
PRS 02- 010
Top: 17.5' Bottom: 20.0'



PRS 02- 010
Top: 20.0' Bottom: 22.5'



Location 02- 01246
PRS 02- 010
Top: 22.5' Bottom: 25.0'



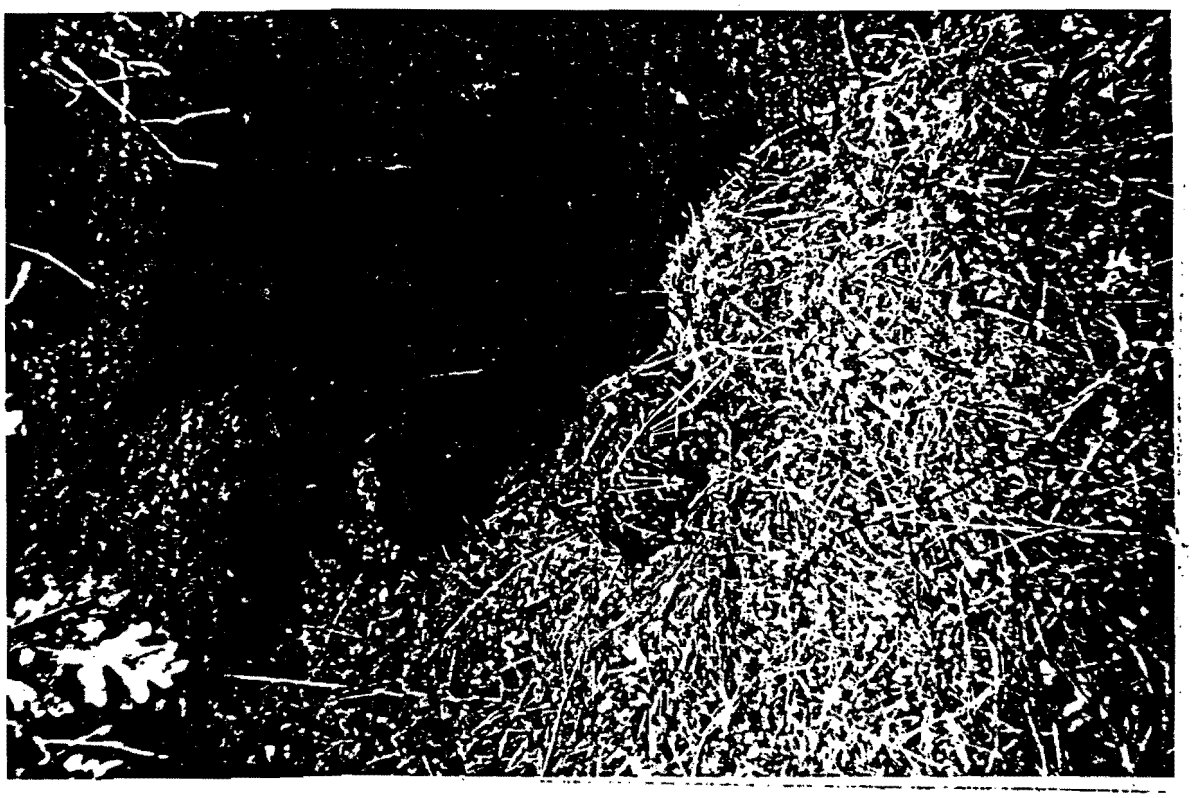
Soil Removal Activities

TA-2 Fire Recovery Work

Soil Removal Activities

TA-2 Fire Recovery Work

Soil Removal Activities



TA-2 Fire Recovery Work

Soil Removal Activities

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Soil Removal Activities

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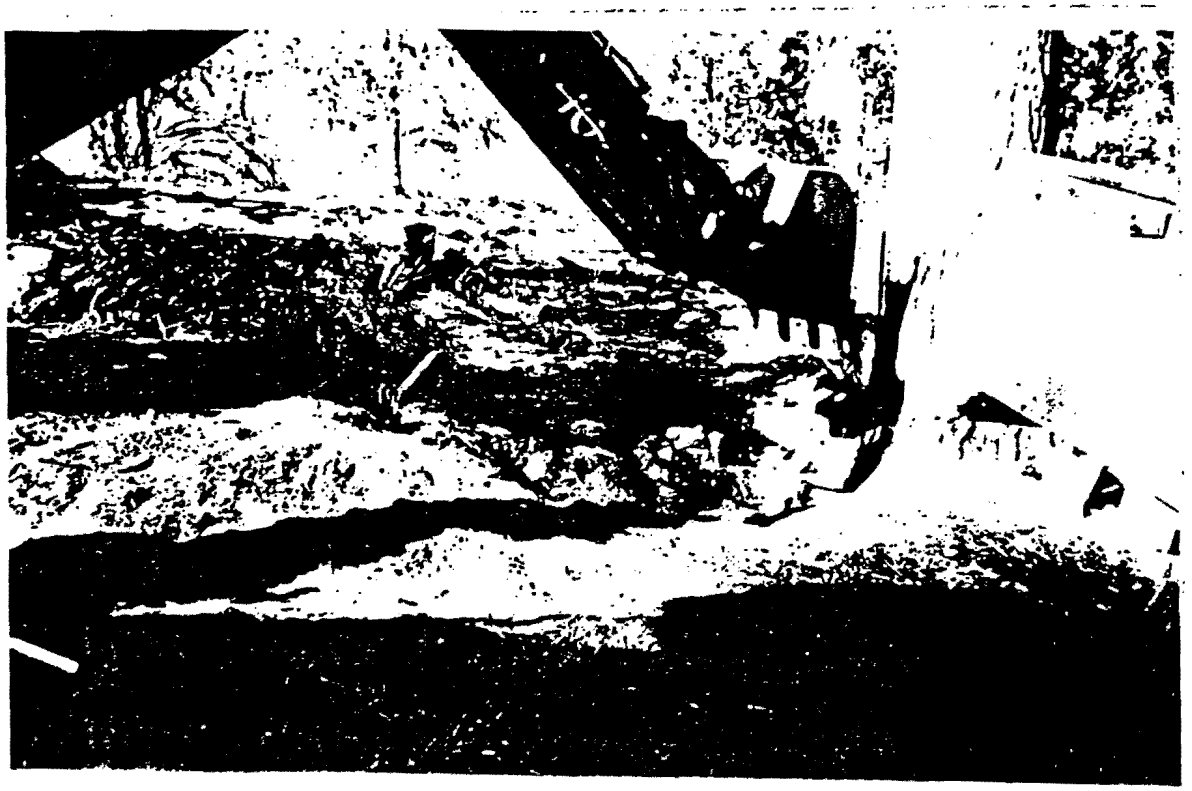
Soil Removal Activities



TA-2 Fire Recovery Work

Soil Removal Activities

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Soil Removal Activities

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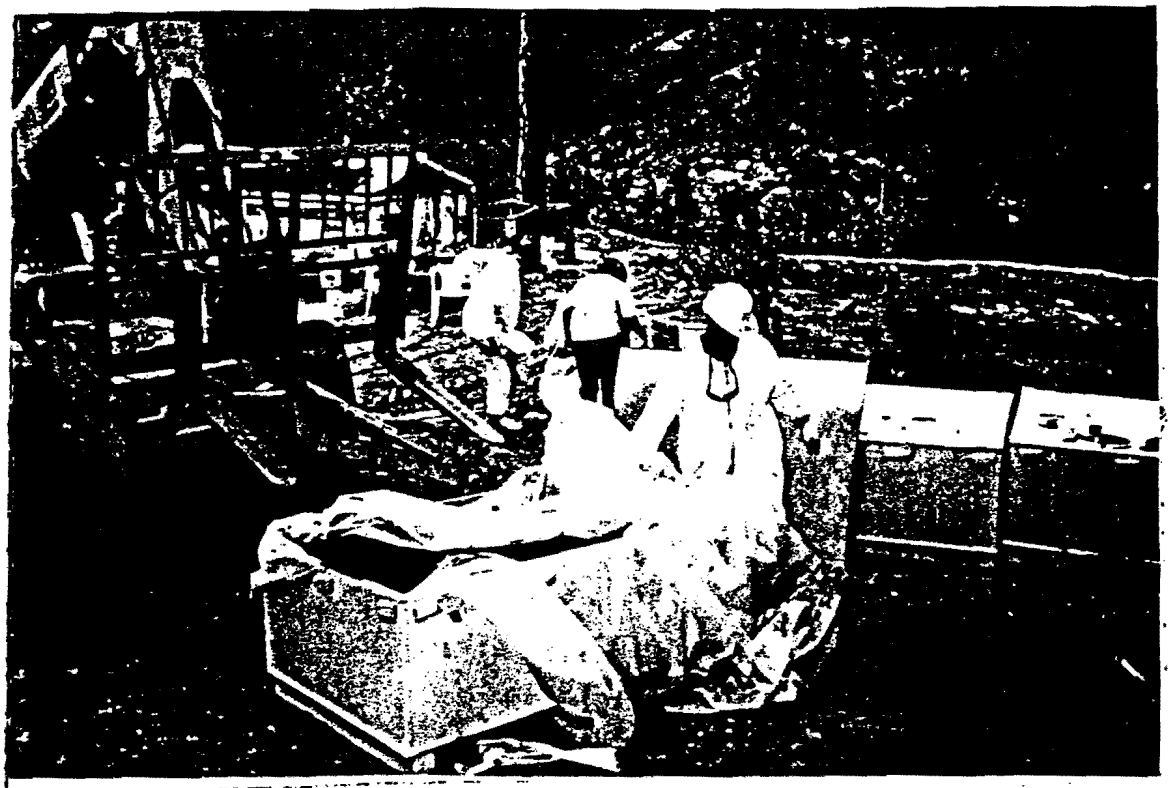
Soil Removal Activities



TA-2 Fire Recovery Work

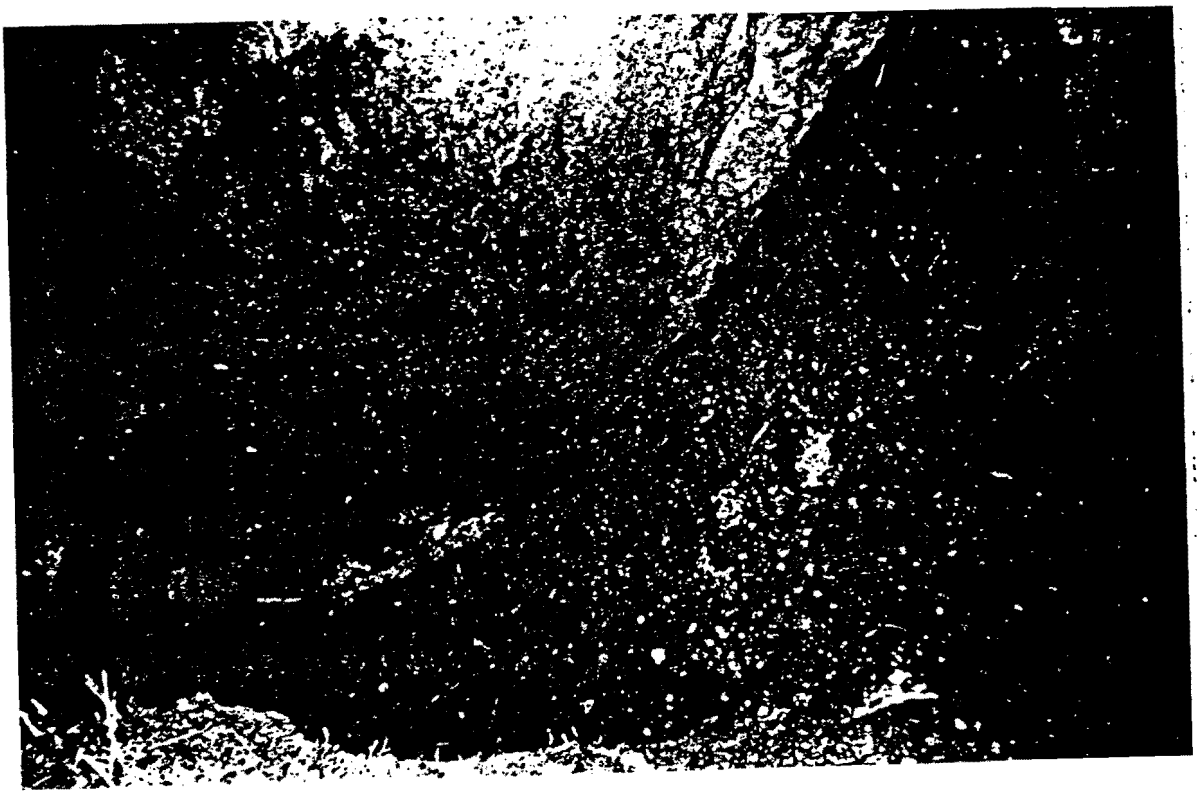
Soil Removal Activities

TA-2 Fire Recovery Work

Soil Removal Activities

TA-2 Fire Recovery Work

Soil Removal Activities



TA-2 Fire Recovery Work

Soil Removal Activities

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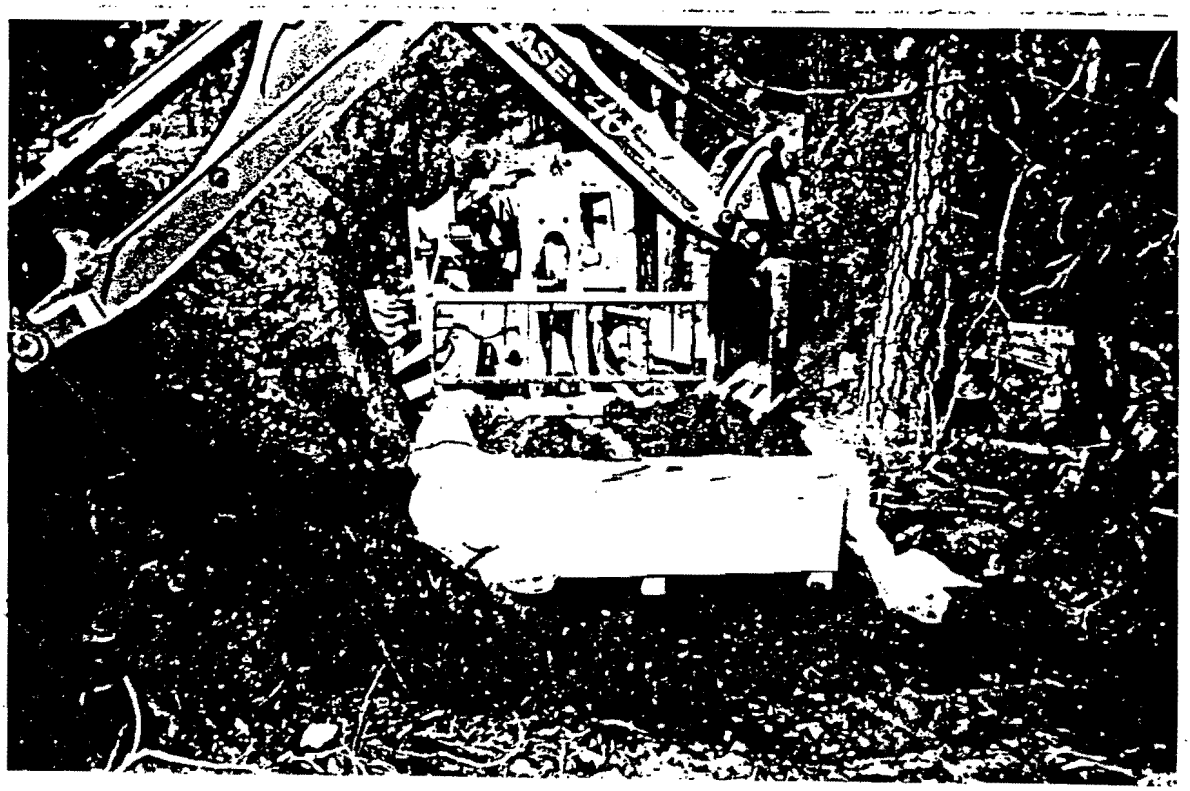
Soil Removal Activities



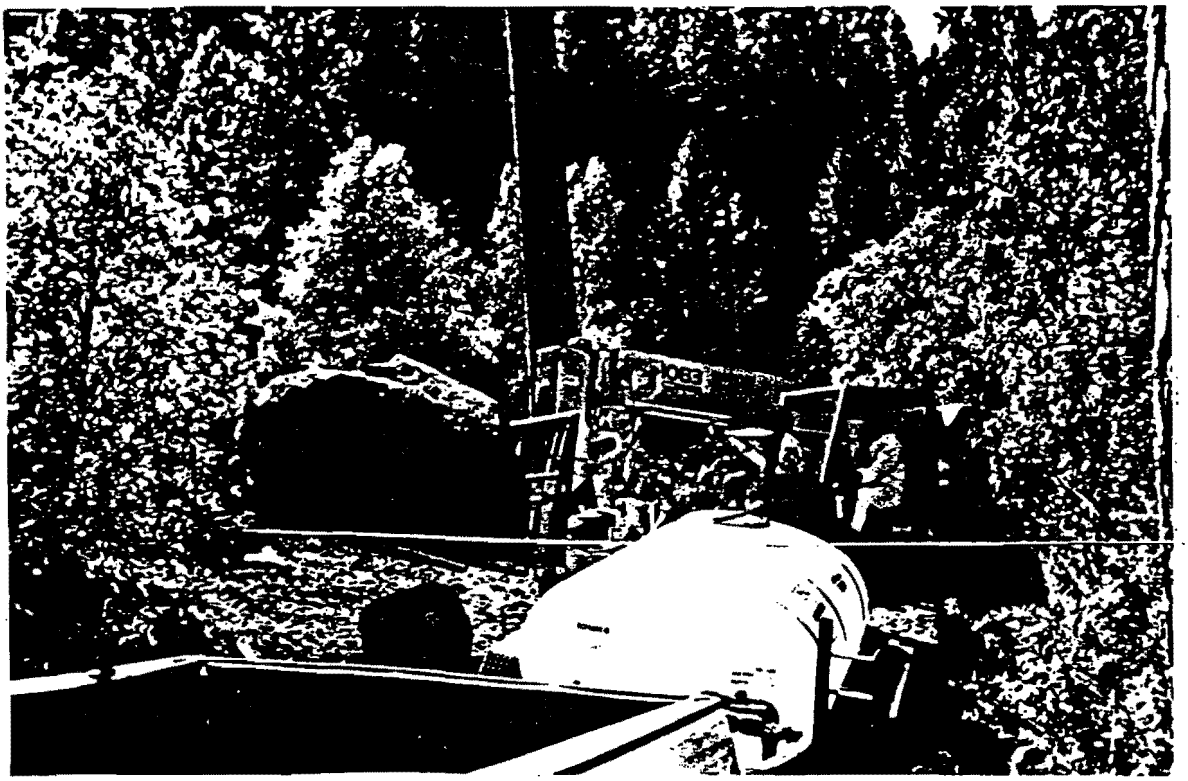
TA-2 Fire Recovery Work

Soil Removal Activities

TA-2 Fire Recovery Work

Soil Removal Activities

Soil Removal Activities



TA-2 Fire Recovery Work

Soil Removal Activities

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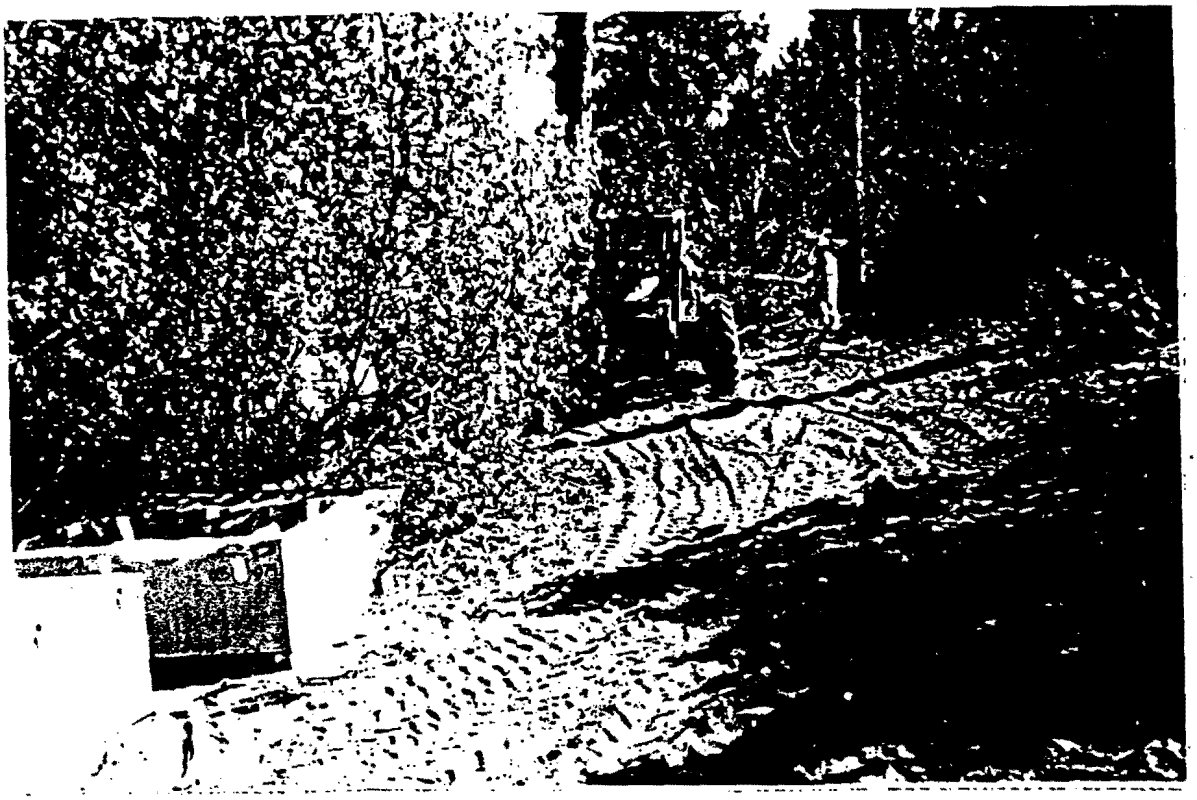
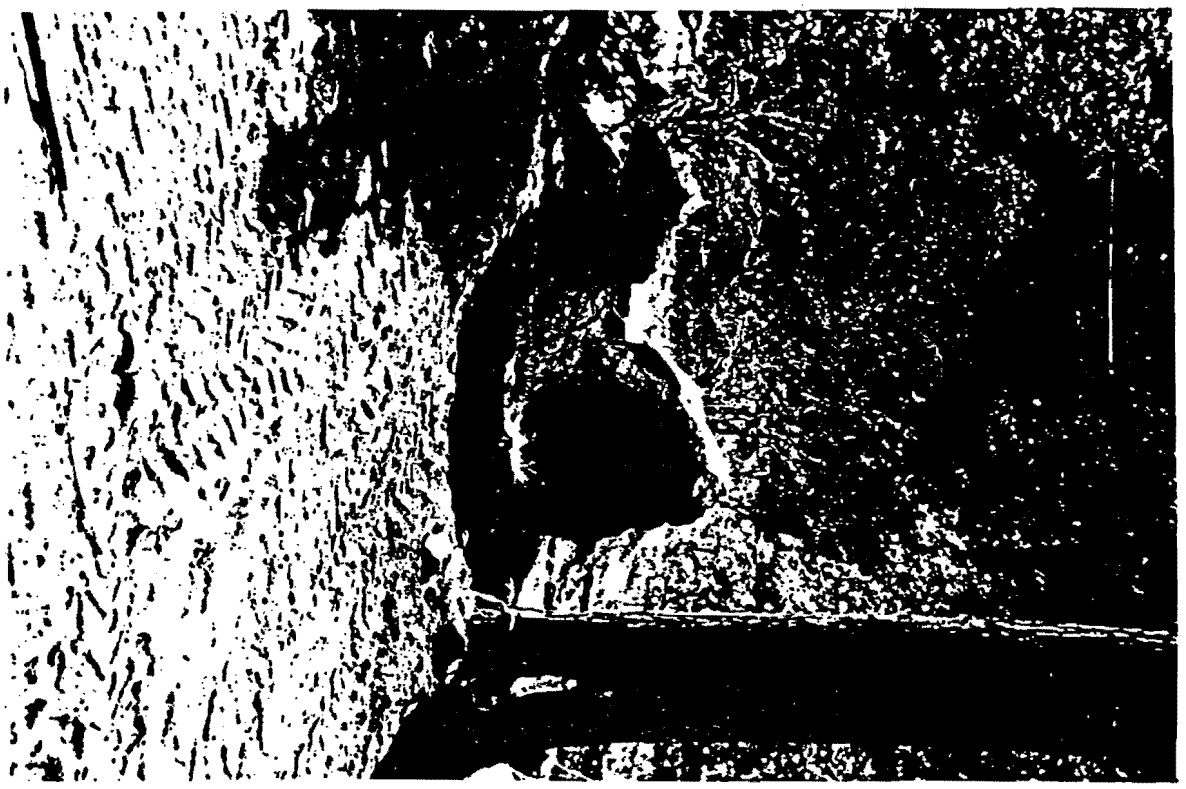
Soil Removal Activities



TA-2 Fire Recovery Work

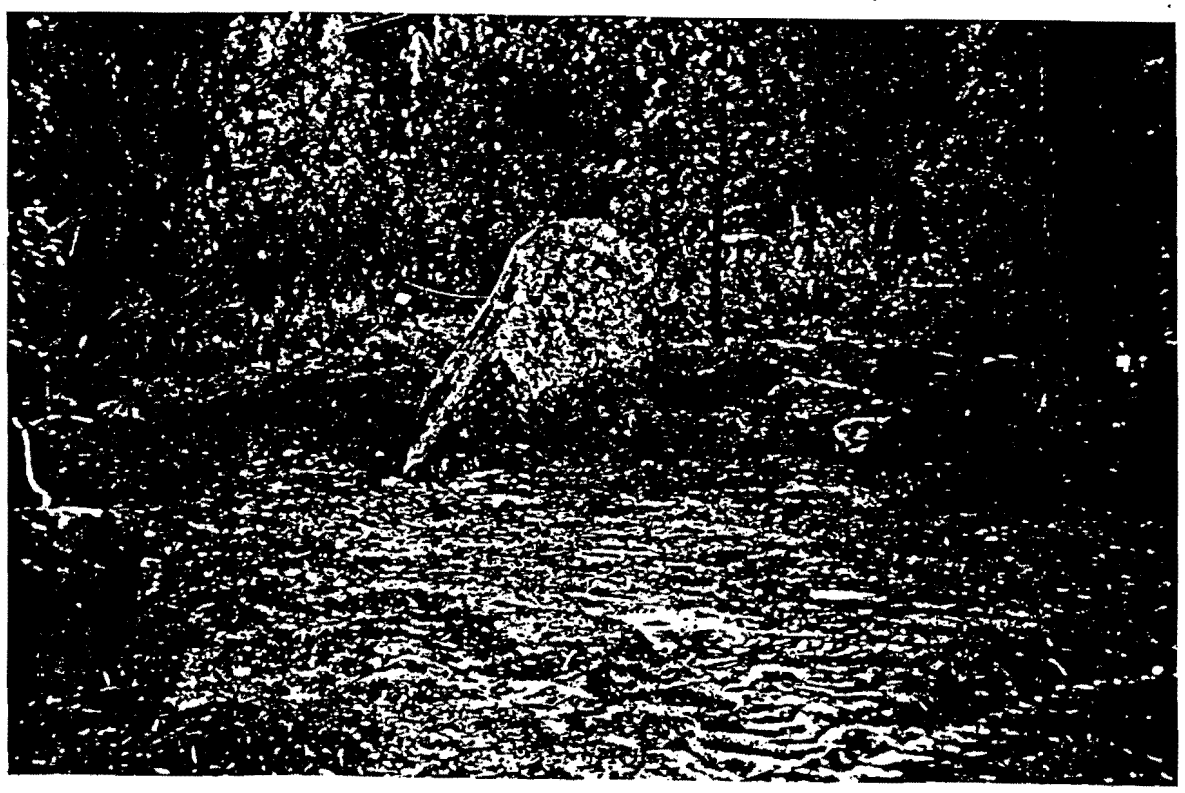
Soil Removal Activities

Soil Removal Activities



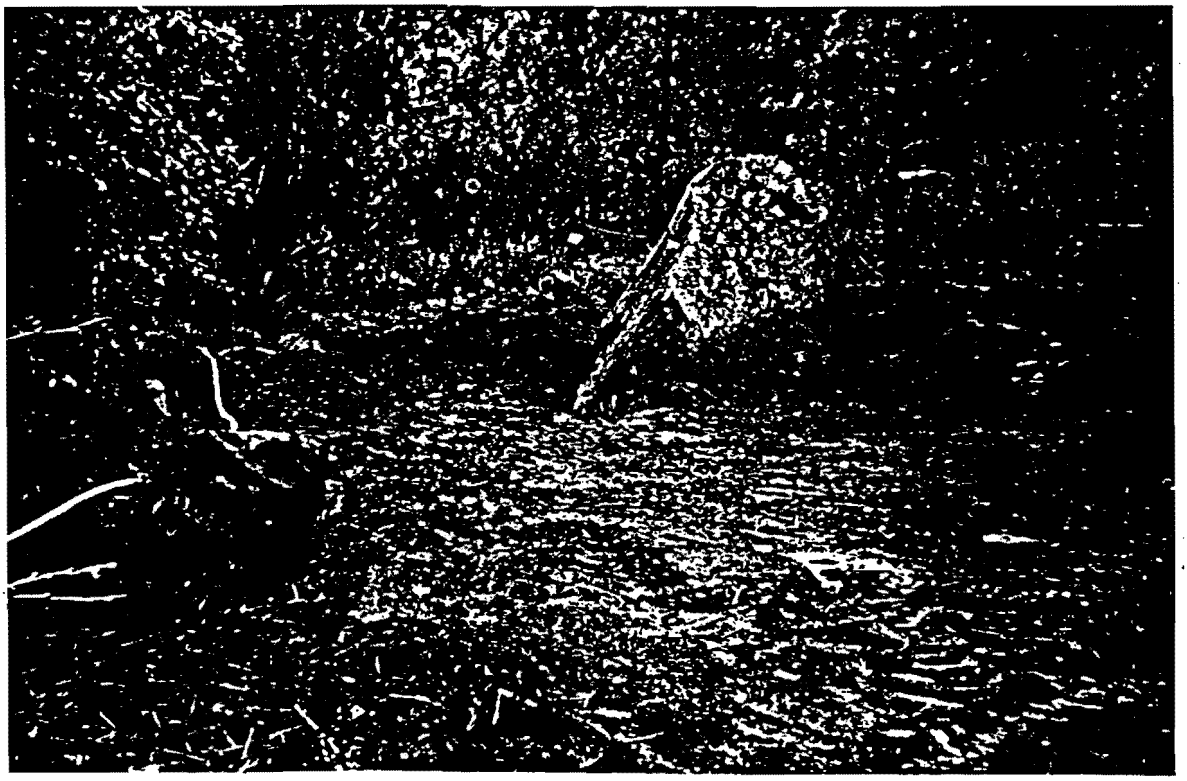
TA-2 Fire Recovery Work

Soil Removal Activities



TA-2 Fire Recovery Work

Site Restoration



TA-2 Fire Recovery Work

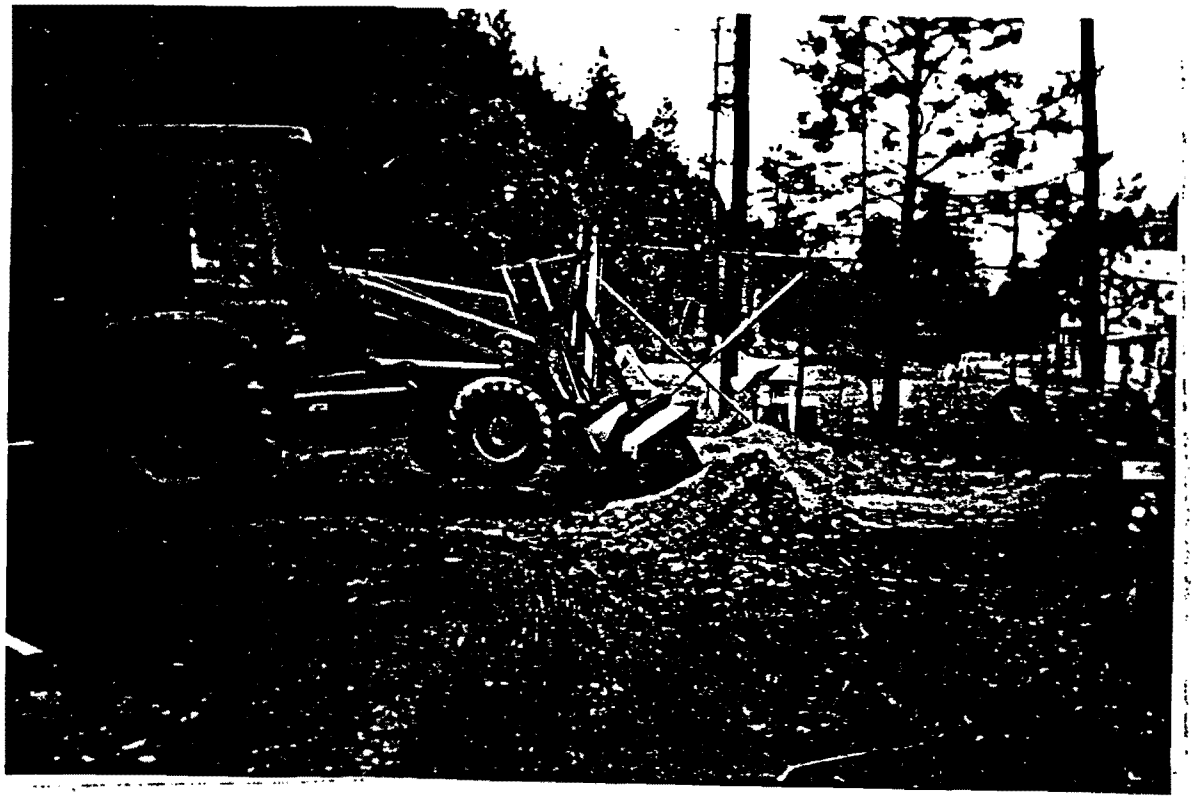
Site Restoration

TA-2 Fire Recovery Work

Site Restoration

TA-2 Fire Recovery Work

Site Restoration



TA-2 Fire Recovery Work

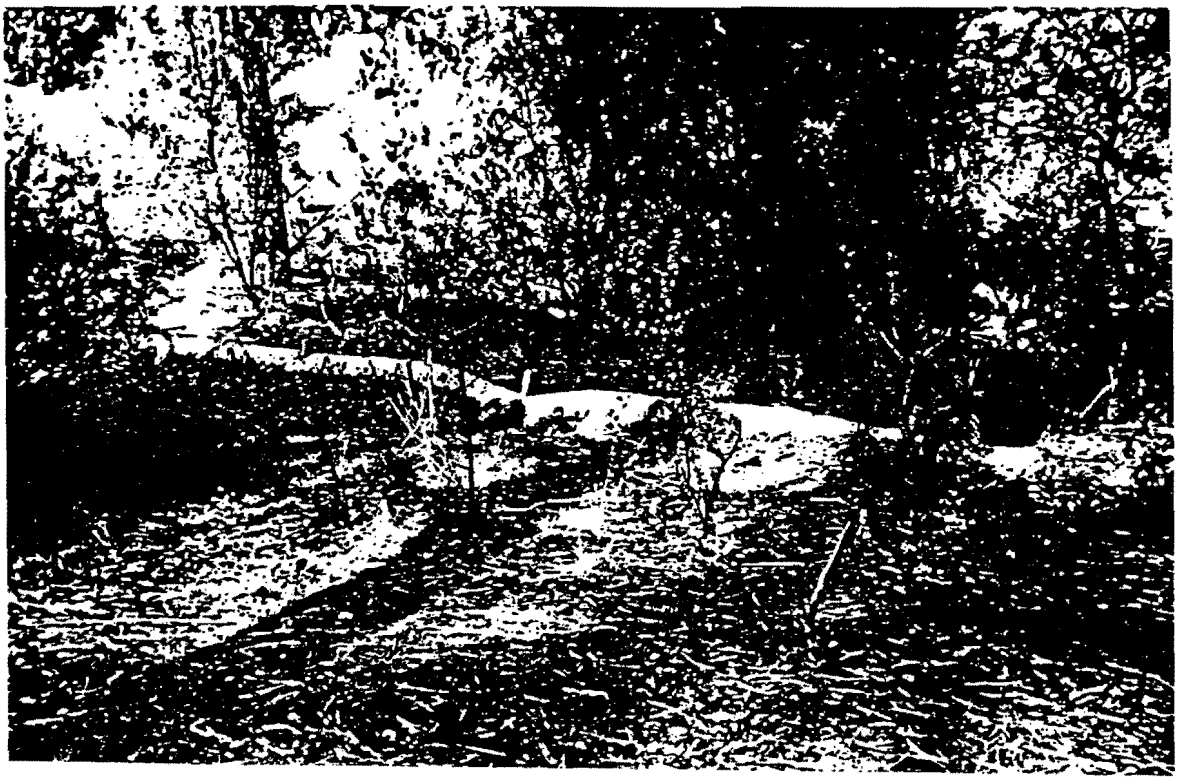
Site Restoration

TA-2 Fire Recovery Work

Site Restoration

TA-2 Fire Recovery Work

Site Restoration



TA-2 Fire Recovery Work

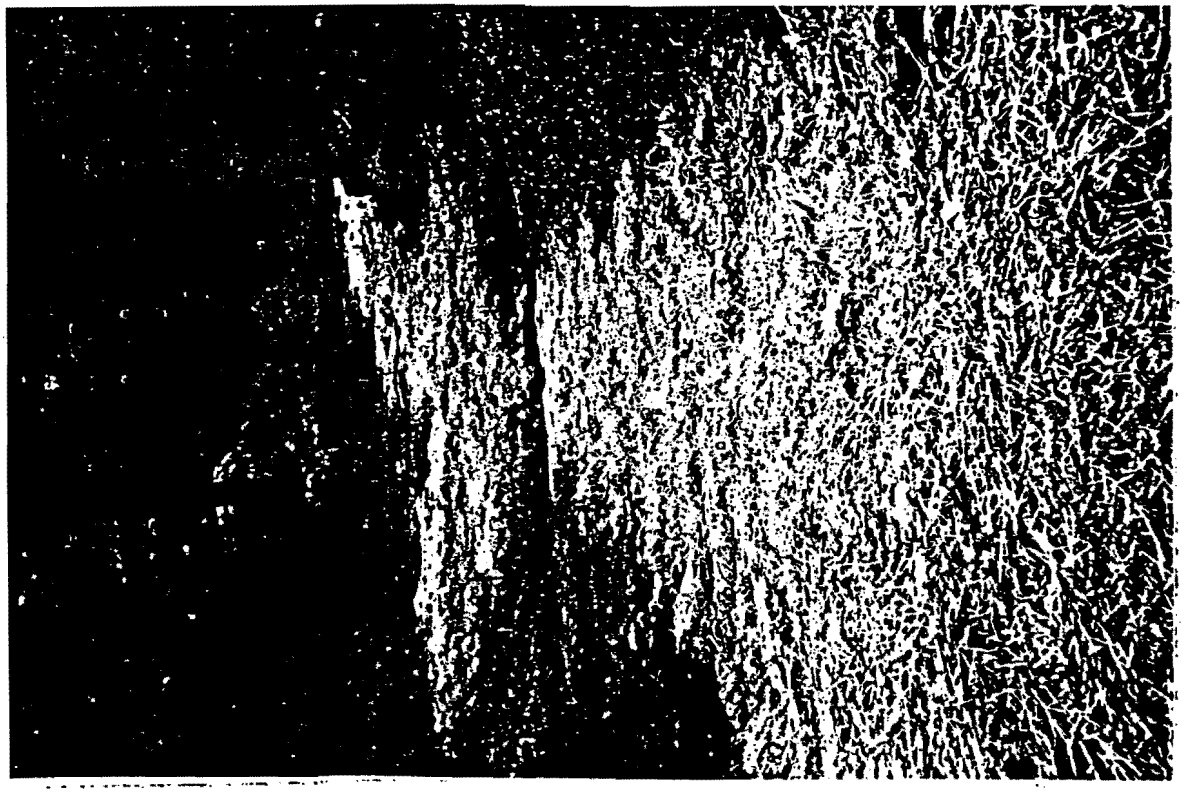
Site Restoration

TA-2 Fire Recovery Work

Site Restoration

TA-2 Fire Recovery Work

Site Restoration

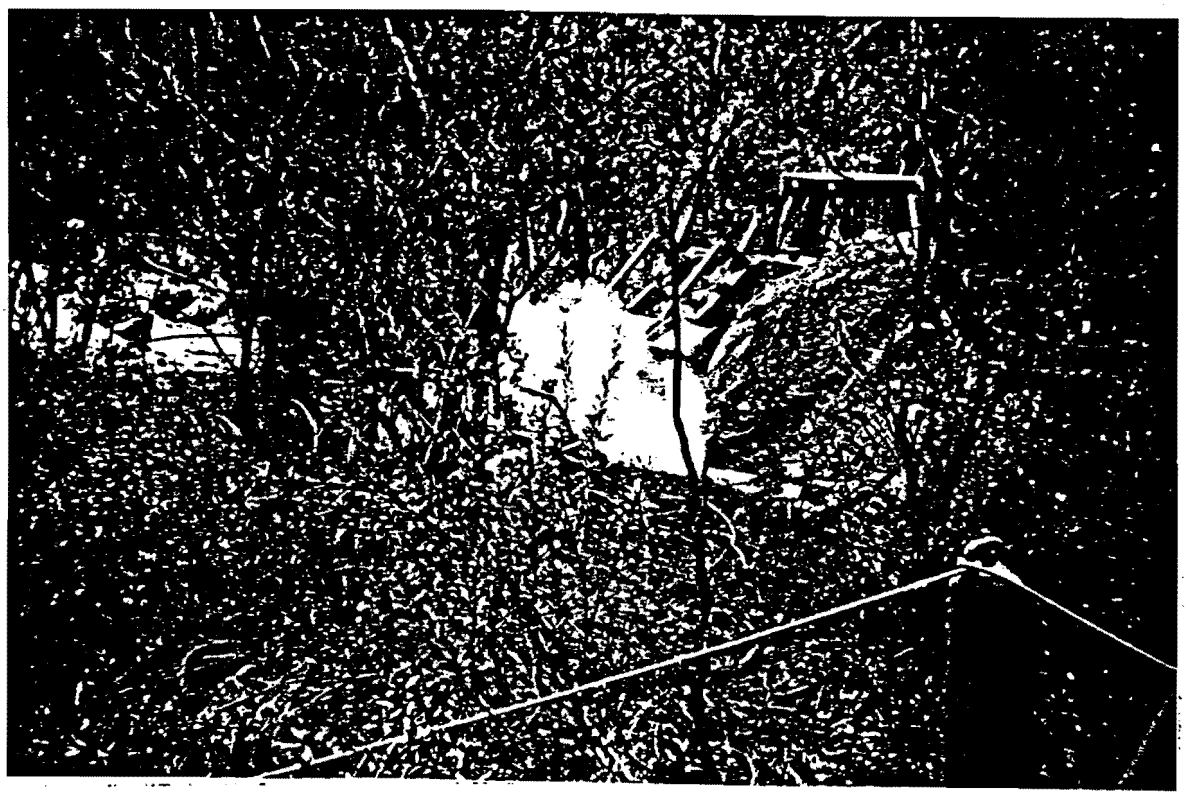


TA-2 Fire Recovery Work

Site Restoration

TA-2 Fire Recovery Work

Site Restoration



TA-2 Fire Recovery Work

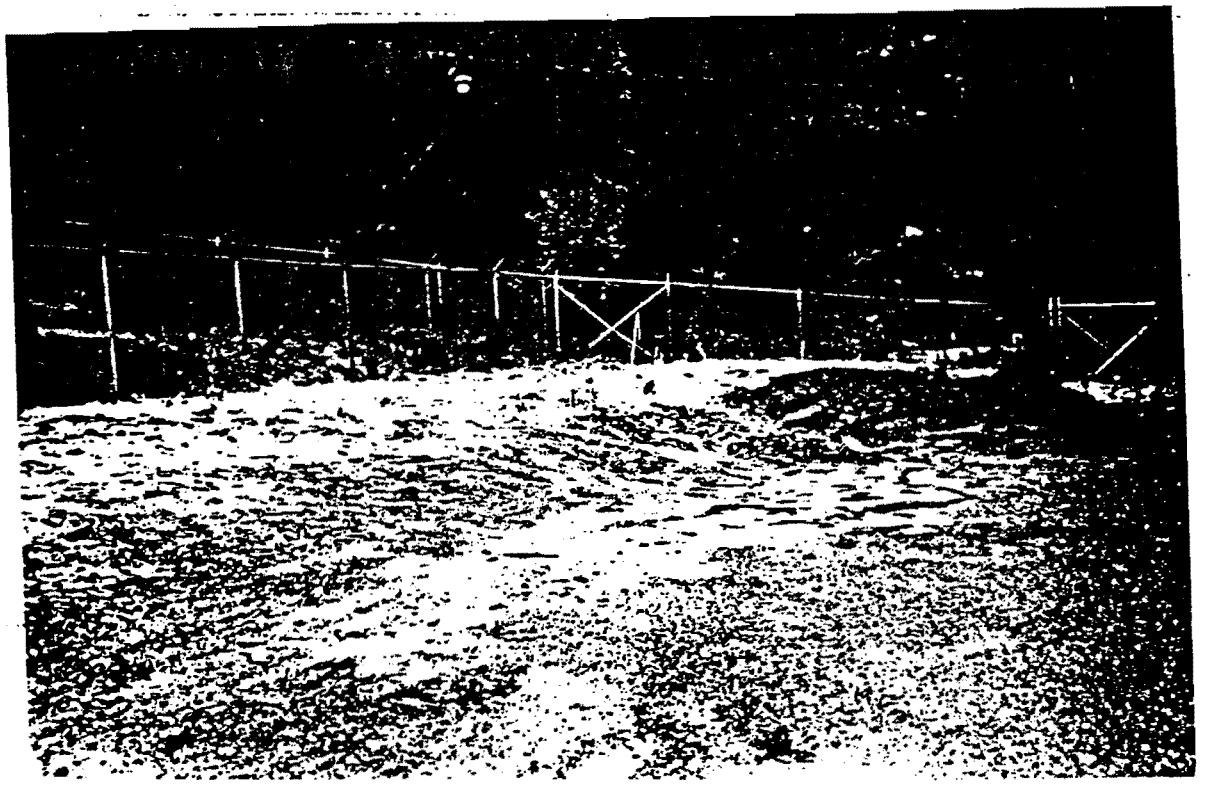
Site Restoration

TA-2 Fire Recovery Work

Site Restoration

TA-2 Fire Recovery Work

Site Restoration



TA-2 Fire Recovery Work

Site Restoration

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Site Restoration

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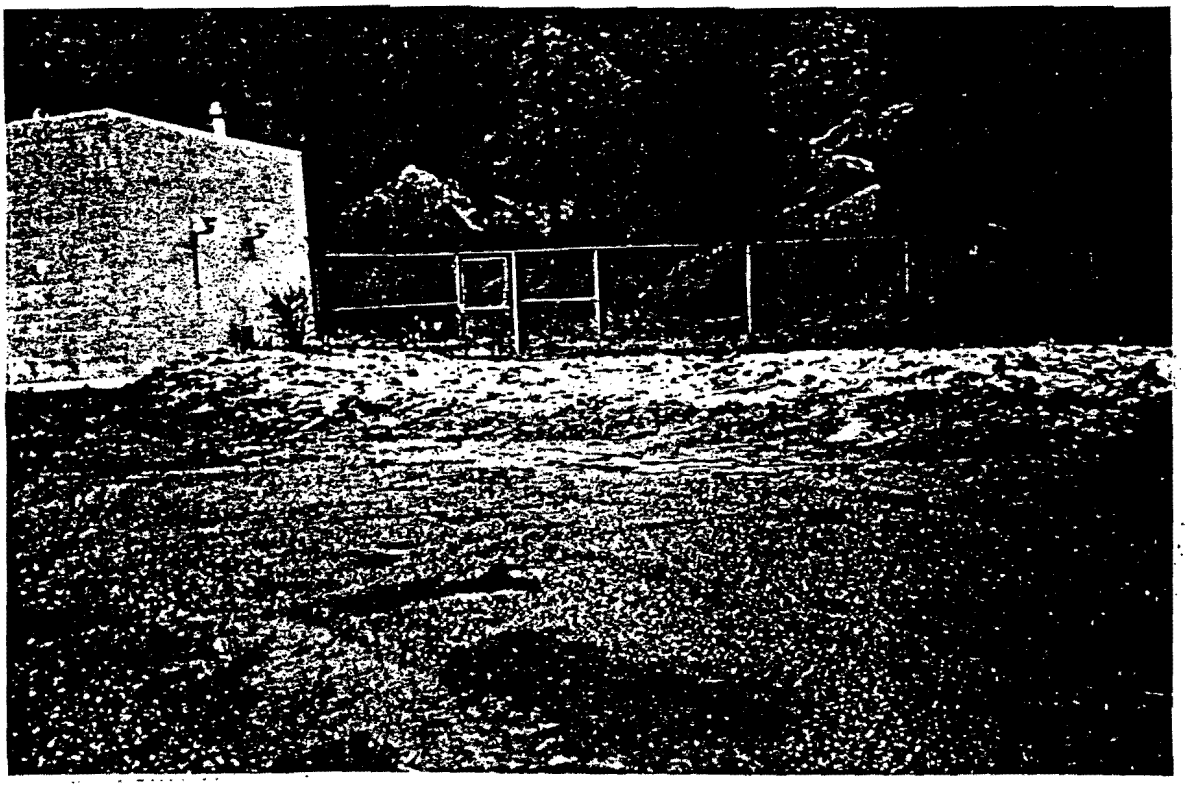
TA-2 Fire Recovery Work

Site Restoration



TA-2 Fire Recovery Work

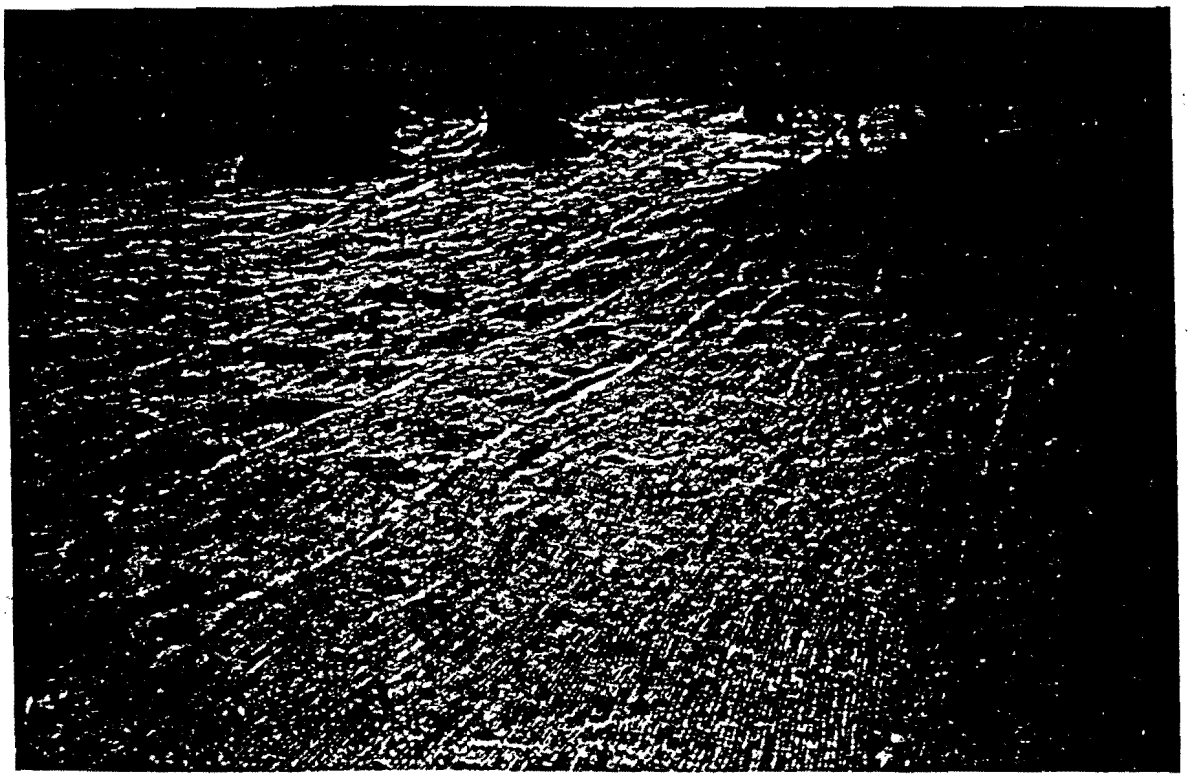
Site Restoration

TA-2 Fire Recovery Work

Site Restoration

TA-2 Fire Recovery Work

Site Restoration

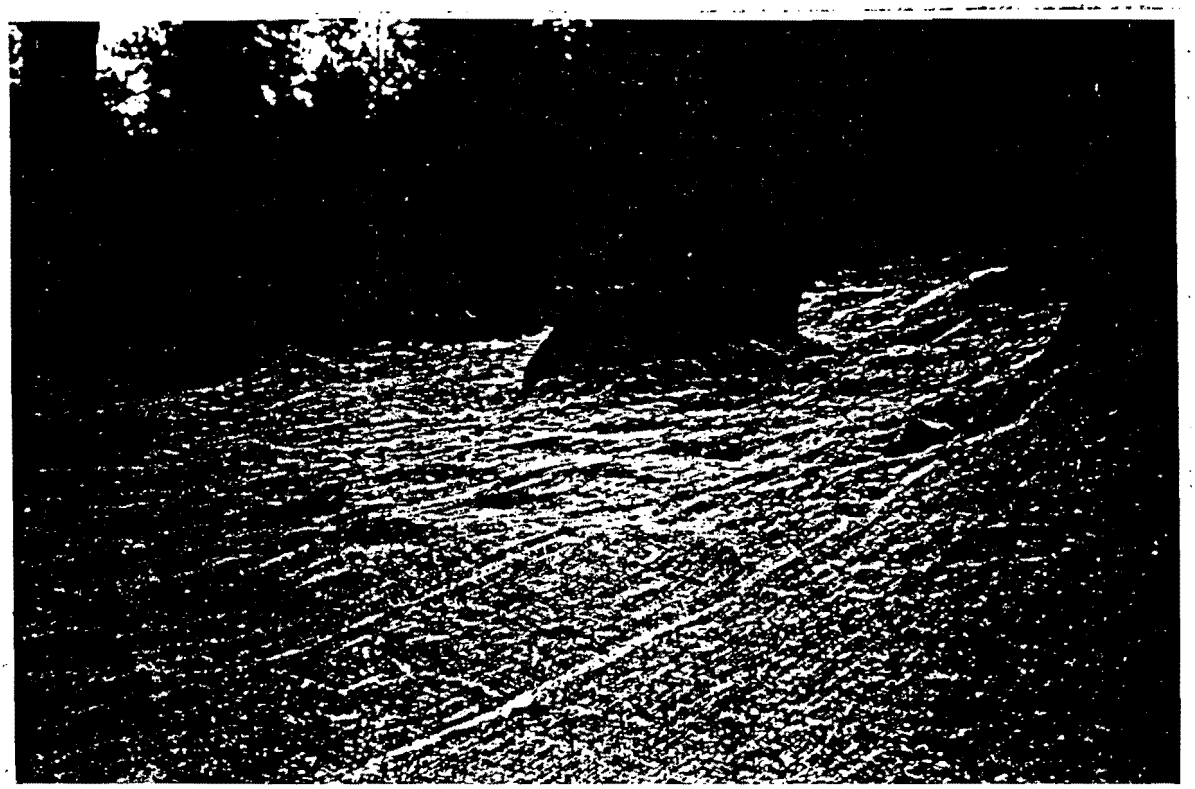


TA-2 Fire Recovery Work

Site Restoration

TA-2 Fire Recovery Work

Site Restoration



APPENDIX C

RESRAD GENERATED PRGs

Memorandum

PMC Environmental
2237 Trinity Drive
Building 2, 1st Floor
Los Alamos, NM 87544-2385
(505) 662-3700
(505) 662-1398 (fax)

PMC Environmental

To: John Crocker

From: Linda Causey

Date: October 17, 2000

Subject: RESRAD PRG for Cs-137

Attached please find the print out for the RESRAD run to determine the Cesium-137 Preliminary Remediation Goal (PRG). The input parameters to the RESRAD computer code were based on the Laboratory Worker, as presented in "Standard Human Health Risk Assessment Scenarios, LANL, April 4, 2000. On page 17 of this attached print out, under the title of Single Radionuclide Soil guidelines G(I,t) in pCi/g, Basic Radiation dose Limit = 30 mrem/yr, you can see that the PRG at time equals zero (t = 0.000E+00), is 44.3 pCi/g. Please don't hesitate to contact me for further clarification or information.

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines

Dose Conversion Factor (and Related) Parameter Summary
File: Default.LIB

Parameter	Current Value	Default	Parameter Name
Dose conversion factors for inhalation, mrem/pCi:			
Cs-137+D	3.190E-05	3.190E-05	DCF2(1)
Dose conversion factors for ingestion, mrem/pCi:			
Cs-137+D	5.000E-05	5.000E-05	DCF3(1)
Food transfer factors:			
Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(1,2)
Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(1,3)
Bioaccumulation factors, fresh water, L/kg:			
Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(1,1)
Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)

Site-Specific Parameter Summary

	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
1	Area of contaminated zone (m**2)	5.556E+02	1.000E+04	---	AREA
1	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0
1	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
1	Basic radiation dose limit (mrem/yr)	3.000E+01	3.000E+01	---	BRDL
1	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
1	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
1	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
1	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
1	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
1	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
1	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
1	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
1	Times for calculations (yr)	not used	0.000E+00	---	T(9)
1	Times for calculations (yr)	not used	0.000E+00	---	T(10)
2	Initial principal radionuclide (pCi/g): Cs-137	1.000E+00	0.000E+00	---	S1(1)
2	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(1)
3	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
3	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
3	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
3	Density of contaminated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSCZ
3	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
3	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
3	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
3	Contaminated zone hydraulic conductivity (m/yr)	4.400E+02	1.000E+01	---	HCCZ
3	Contaminated zone b parameter	5.000E+00	5.300E+00	---	BCZ
3	Average annual wind speed (m/sec)	3.000E+00	2.000E+00	---	WIND
3	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
3	Evapotranspiration coefficient	9.990E-01	5.000E-01	---	EVAPTR
3	Precipitation (m/yr)	4.800E-01	1.000E+00	---	PRECIP
3	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
3	Irrigation mode	overhead	overhead	---	IDITCH
3	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
3	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
3	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
4	Density of saturated zone (g/cm**3)	not used	1.500E+00	---	DENSAQ
4	Saturated zone total porosity	not used	4.000E-01	---	TPSZ
4	Saturated zone effective porosity	not used	2.000E-01	---	EPSZ
4	Saturated zone field capacity	not used	2.000E-01	---	FCSZ
4	Saturated zone hydraulic conductivity (m/yr)	not used	1.000E+02	---	HCSZ
4	Saturated zone hydraulic gradient	not used	2.000E-02	---	HGWT
4	Saturated zone b parameter	not used	5.300E+00	---	BSZ
4	Water table drop rate (m/yr)	not used	1.000E-03	---	VWT
4	Well pump intake depth (m below water table)	not used	1.000E+01	---	DWIBWT
4	Model: Nondispersion (ND) or Mass-Balance (MB)	not used	ND	---	MODEL
4	Well pumping rate (m**3/yr)	not used	2.500E+02	---	UW
5	Number of unsaturated zone strata	not used	1	---	NS

Site-Specific Parameter Summary (continued)

Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1
Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
Unsat. zone 1, field capacity	not used	2.000E-01	---	FCUZ(1)
Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
Distribution coefficients for Cs-137				
Contaminated zone (cm**3/g)	1.390E+02	1.000E+03	---	DCNUCC(
Unsaturated zone 1 (cm**3/g)	not used	1.000E+03	---	DCNUCU(
Saturated zone (cm**3/g)	not used	1.000E+03	---	DCNUCS(
Leach rate (/yr)	0.000E+00	0.000E+00	1.312E-06	ALEACH(
Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(
Inhalation rate (m**3/yr)	1.402E+04	8.400E+03	---	INHALR
Mass loading for inhalation (g/m**3)	2.000E-03	1.000E-04	---	MLINH
Exposure duration	3.000E+01	3.000E+01	---	ED
Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
Fraction of time spent indoors	0.000E+00	5.000E-01	---	FIND
Fraction of time spent outdoors (on site)	2.300E-01	2.500E-01	---	FOTD
Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
Radii of shape factor array (used if FS = -1):				
Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAI
Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAI
Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAI
Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAI
Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAI
Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAI
Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAI
Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAI
Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAI
Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAI
Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAI
Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAI
Fractions of annular areas within AREA:				
Ring 1	not used	1.000E+00	---	FRACA(1
Ring 2	not used	2.732E-01	---	FRACA(2
Ring 3	not used	0.000E+00	---	FRACA(3
Ring 4	not used	0.000E+00	---	FRACA(4
Ring 5	not used	0.000E+00	---	FRACA(5
Ring 6	not used	0.000E+00	---	FRACA(6
Ring 7	not used	0.000E+00	---	FRACA(7
Ring 8	not used	0.000E+00	---	FRACA(8
Ring 9	not used	0.000E+00	---	FRACA(9
Ring 10	not used	0.000E+00	---	FRACA(10
Ring 11	not used	0.000E+00	---	FRACA(11
Ring 12	not used	0.000E+00	---	FRACA(12

Site-Specific Parameter Summary (continued)

	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
B	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
B	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
B	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
B	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
B	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
B	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
B	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
B	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
B	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
B	Contamination fraction of household water	not used	1.000E+00	---	FHHW
B	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
B	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
B	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
B	Contamination fraction of plant food	not used	-1	---	FPLANT
B	Contamination fraction of meat	not used	-1	---	FMEAT
B	Contamination fraction of milk	not used	-1	---	FMILK
9	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
9	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
9	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
9	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
9	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
9	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
9	Depth of roots (m)	not used	9.000E-01	---	DROOT
9	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
9	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
9	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
9	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR

Site-Specific Parameter Summary (continued)

Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
Storage times of contaminated foodstuffs (days):				
Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(
Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(
Milk	1.000E+00	1.000E+00	---	STOR_T(
Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(
Fish	7.000E+00	7.000E+00	---	STOR_T(
Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(
Well water	1.000E+00	1.000E+00	---	STOR_T(
Surface water	1.000E+00	1.000E+00	---	STOR_T(
Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(
Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
Total porosity of the cover material	not used	4.000E-01	---	TPCV
Total porosity of the building foundation	not used	1.000E-01	---	TPFL
Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
Diffusion coefficient for radon gas (m/sec):				
in cover material	not used	2.000E-06	---	DIFCV
in foundation material	not used	3.000E-07	---	DIFFL
in contaminated zone soil	not used	2.000E-06	---	DIFCZ
Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
Height of the building (room) (m)	not used	2.500E+00	---	HRM
Building interior area factor	not used	0.000E+00	---	FAI
Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
Number of graphical time points	32	---	---	NPTS
Maximum number of integration points for dose	17	---	---	LYMAX
Maximum number of integration points for risk	513	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	555.60 square meters	Cs-137	1.000E+00
ness:	2.00 meters		
Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 30 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

(years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	6.772E-01	6.617E-01	6.318E-01	5.375E-01	3.386E-01	6.717E-02	6.610E-04	6.249E-11
M(t):	2.257E-02	2.206E-02	2.106E-02	1.792E-02	1.129E-02	2.239E-03	2.203E-05	2.083E-12

mum TDOSE(t): 6.772E-01 mrem/yr at t = 0.000E+00 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

io-lide	Ground		Inhalation		Radon		Plant		Meat		Milk		
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/y
137	6.769E-01	0.9996	2.214E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.305E-
al	6.769E-01	0.9996	2.214E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.305E-

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

io-lide	Water		Fish		Radon		Plant		Meat		Milk		All I
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/y
137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.772E-
al	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.772E-

m of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

o-ide	Ground		Inhalation		Radon		Plant		Meat		Milk		s
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/y
37	6.615E-01	0.9996	2.164E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.253E-
l	6.615E-01	0.9996	2.164E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.253E-

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

io-ide	Water		Fish		Radon		Plant		Meat		Milk		All I
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/y
37	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.617E-
l	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.617E-

n of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

io-lide	Ground		Inhalation		Radon		Plant		Meat		Milk		s
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/y
137	6.316E-01	0.9996	2.066E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.151E-
al	6.316E-01	0.9996	2.066E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.151E-

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

io-lide	Water		Fish		Radon		Plant		Meat		Milk		All I
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/y
-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.318E-
al	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.318E-

um of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

o-	Ground		Inhalation		Radon		Plant		Meat		Milk		
ide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/y
37	5.373E-01	0.9996	1.758E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.830E-
1	5.373E-01	0.9996	1.758E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.830E-

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

o-	Water		Fish		Radon		Plant		Meat		Milk		All
ide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/y
37	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.375E-
1	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.375E-

of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

	Ground		Inhalation		Radon		Plant		Meat		Milk		
de	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/y
7	3.384E-01	0.9996	1.107E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.153E-
	3.384E-01	0.9996	1.107E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.153E-

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All I
de	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/y
37	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.386E-
	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.386E-

of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

	Ground		Inhalation		Radon		Plant		Meat		Milk		
de	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/y
7	6.715E-02	0.9996	2.197E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.287E-
	6.715E-02	0.9996	2.197E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.287E-

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

	Water		Fish		Radon		Plant		Meat		Milk		All I
de	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/y
7	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.717E-
	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.717E-

of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

io-clide	Ground		Inhalation		Radon		Plant		Meat		Milk		s
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/y
137	6.608E-04	0.9996	2.162E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.250E-
al	6.608E-04	0.9996	2.162E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.250E-

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

dio-lide	Water		Fish		Radon		Plant		Meat		Milk		All I
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/y
-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.610E-
al	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.610E-

um of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

o-	Ground		Inhalation		Radon		Plant		Meat		Milk		s
ide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/y
37	6.246E-11	0.9996	2.043E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.127E-
l	6.246E-11	0.9996	2.043E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.127E-

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

o-	Water		Fish		Radon		Plant		Meat		Milk		All I
ide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/y
37	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.249E-
l	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.249E-

of all water independent and dependent pathways.

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

?	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
37	Cs-137	1.000E+00	6.772E-01	6.617E-01	6.318E-01	5.375E-01	3.386E-01	6.717E-02	6.610E-04	6.249E-11

nch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF
DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 30 mrem/yr

ide	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
7	4.430E+01	4.534E+01	4.748E+01	5.582E+01	8.861E+01	4.466E+02	4.538E+04	4.801E+11

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 0.000E+00 years

ide	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
37	1.000E+00	0.000E+00	6.772E-01	4.430E+01	6.772E-01	4.430E+01

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr							
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
37	Cs-137	1.000E+00	6.772E-01	6.617E-01	6.318E-01	5.375E-01	3.386E-01	6.717E-02	6.610E-04	6.249E-11

i) is the branch fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

ide	Parent (i)	BRF(i)	S(j,t), pCi/g							
)			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
37	Cs-137	1.000E+00	1.000E+00	9.772E-01	9.330E-01	7.937E-01	5.000E-01	9.920E-02	9.762E-04	9.228E-11

i) is the branch fraction of the parent nuclide.

ROGRA~1\RESMAIN3.EXEexecution time = 3.79 seconds

APPENDIX D

CHEMRAD

RADIOLOGICAL SURVEYS

REPORT

CHEMRAD

. . . from data to decisions

Radiological Surveys of Selected Reaches in Canyons and Facilities Near the Los Alamos National Laboratory

FINAL REPORT

Work Performed by
CHEMRAD

May 9, 2000 through October 19, 20000

for
Washington Group (MK/PMC)
Subcontract No. XB8-4931-SC23

November 15, 2000

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November 15, 2000

Phase 1 performed by Charles "Chuck" Flynn, James McNamara, and Lee Stricklin
Phase 2 performed by Chuck Flynn, Gary Turner, and James McNamara
Phase 3 performed by Chuck Flynn, James McNamara, Katie Felde, and Jeff Auble
Phase 4 performed by Carl Jozaitis, Gary Turner, and Mike Eckermann

Report prepared by Michael Mason, CES, PG and Gary Turner

Reviewed and approved by Charles R. "Chuck" Flynn, President

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1.0 EXECUTIVE SUMMARY

Washington Group (formerly MK/PMC) of Los Alamos, New Mexico, contracted CHEMRAD to perform USRADS® (UltraSonic Ranging and Data System) radiation scanning surveys at designated Los Alamos National Laboratory sites. The primary purpose of the scanning surveys was to identify the presence of gamma emitting radionuclides in the following areas:

- In the vicinity of stream channels that flow through some of the canyons in the area (e.g. LA Canyon, DP Canyon, Pueblo Canyon, and Mortandad Canyon)
- In the areas in and adjacent to the Omega West Reactor and Tech Area 41 sites
- In areas undergoing or having completed remediation

The survey was conducted by CHEMRAD under purchase order 4931559 dated October 2, 2000, subcontract no. XB8-4931-SC23 issued by Washington Group (Morrison-Knudsen (MK) Corporation-Federal Programs Division). The order specifies that CHEMRAD provide radiological surveys in support of environmental restoration services under Contract G661708-8M between MK and the University of California.

This work is based on the success of similar efforts conducted during 1996 through 1999 in Pueblo, Los Alamos, and DP Canyons. This work is part of a multifaceted program to document current conditions and to model contaminant transport and deposition in the canyons. This work was initiated on May 9, 2000 and consisted of gross gamma radiation scanning surveys in conducted during the following phases:

Phase 1 – LA Canyon (09 through 10 May–interrupted by forest fire)

Phase 2 – LA Canyon, DP Canyon, and Mortandad, and iterative re-surveys of ongoing remediation excavations in LA Canyon (21 June through 08 July)

Phase 3 – LA Canyon and a candidate site adjacent to the SE corner of the Omega West Reactor site (15 through 25 August)

Phase 4 – Omega West Reactor site (Tech Area 02) and selected adjacent areas (06 through 20 October)

All four phases were completed by October 19, 2000. This executive summary briefly presents the major findings of this work. The detail methods and findings are presented in the main body of this report. The main body of this report is organized by site designation (e.g. DP Canyon, Omega Reactor, etc.) with corresponding tabs in the body of this report. Surveys completed to date are graphically illustrated following Table 1. Detailed descriptions of the operation of the USRADS equipment, data processing issues, and QA/QC are included as additional sections to this report. Please refer to the CAD map at the end of this executive summary.

The USRADS-2300 system was interfaced to a Ludlum Model 3 ratemeter with a 44-2 (1x1) sodium iodide (NaI) probe for gamma readings. Readings were automatically located, displayed and recorded each second by USRADS. Summary statistics resulting from the radiation survey tasks are listed in Table 1.

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Table 1. Summary Statistics for the USRADS Radiation Survey Tasks

Data file name	Canyon reach designation	Survey area (acres)	Number of survey days	Survey number of data points	Survey maximum value (cpm)	Survey mean value (cpm)	Survey standard deviation
LA50970	LA Canyon	15.03	9.5	76,840	21,384	5,671	1,374
LAR630 (last survey 4 of 4)[5]	LA Canyon remediation surveys	0.28	2.5 (total)	4,427 (last, 4 of 4) 26,974 (total)	10,680 (last)	5,859 (last)	1,093 (last)
LANL2EC	LA Canyon 2EC	2.53	3	24,929	9,000	5,148	752
LANL3WC	LA Canyon 3WC	4.42	5	41,712	9,900	1,478	1,969
MORT070	Mortandad Canyon	3.21	1	13,853	7,200	4,803	579
DPTRANS	DP Canyon	1.85	2	24,115	76,020	5,986	4,760
DPSOUTH	DP Canyon south area	0.25	0.5	5,094	92,700	15,736	10,961
LA043ALC	Omega West reactor site SE gate area	0.33	1	22,578	1,197,90 (see T2ALLM)	8,512	47,403
T2ALLM	Omega West reactor site	4.31	7.5	49,470	260,160	7,097	5,683
T41M	East Side of Tech Area 41 buildings	0.73	2	12,867	7,320	4,421	818
T410192B	Ditch and culvert at Tech 41 gate	0.04	0.5	394	4,680	3,501	488
Totals		*32.98*	*34.5*	*298,826*	*NA*	*NA*	*NA*

Notes:

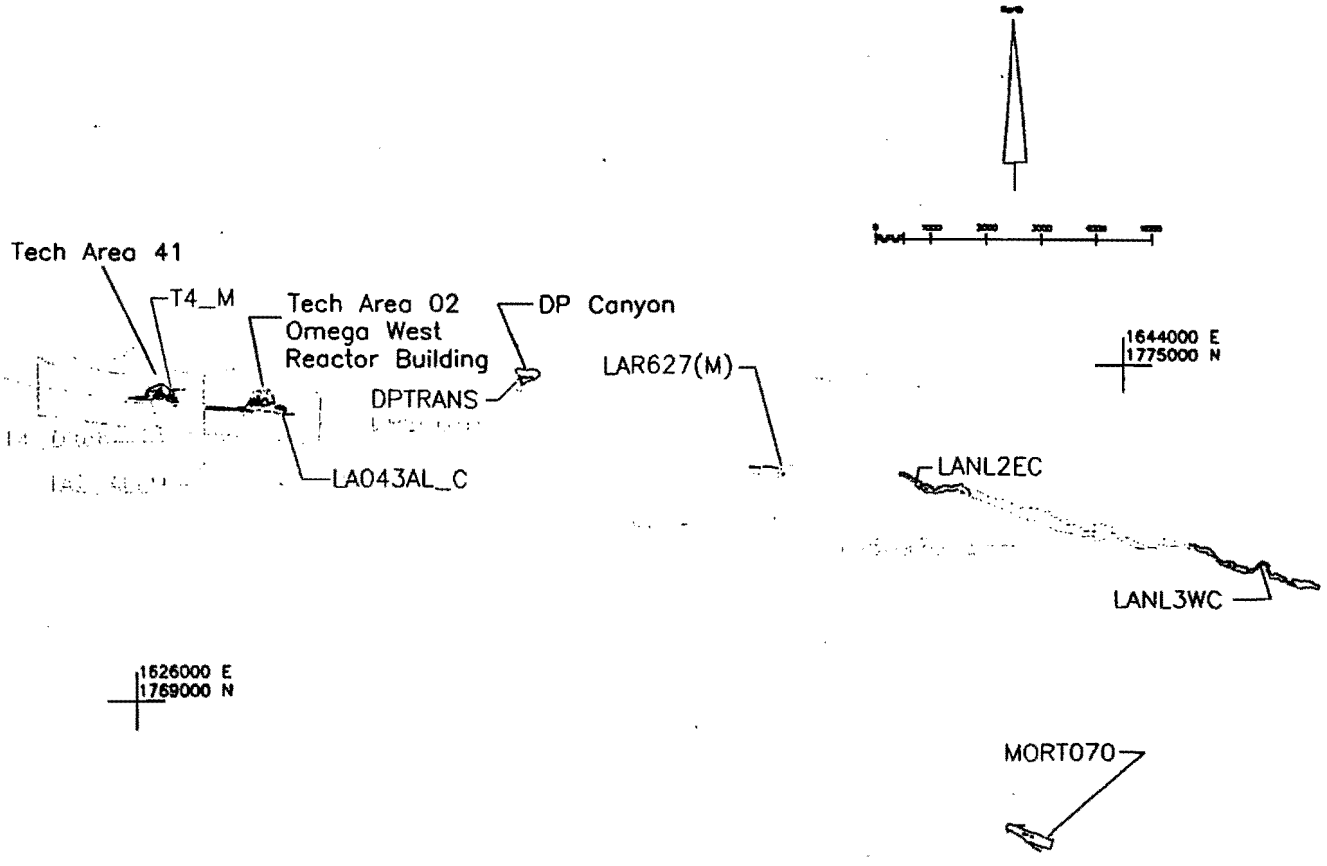
(1) Days are estimated based on equivalent 8-hour days. Approximately 3 additional days were committed to site walkovers, GET, and badging.

(2) Uncertainty values in this report are stated as +/-1 standard deviation.

(3) Survey mean values include elevated values and may not be normally distributed.

(4) Mean reference values are listed for the local reference sites.

(5) 4 surveys were conducted over the remediation site in Phase 2



YEAR 2000 SURVEYS

Los Alamos National Laboratory

Tech Area 41, Tech Area 02, LA Canyon, Mortandad, & DP Canyon

CHEMRAD

sources: Washington Group .dxf files
CHEMRAD surveys

2K_surveys.dwg

As part of these scanning surveys, several of the elevated findings were re-acquired for verification and noted as candidate locations for further investigation.

Summary findings for the gamma radiation scanning surveys include the following:

1. LA Canyon in the vicinity of a line between 1641802E, 1772499N and 1642225E, 1772700N has areas above 10,000 cpm, with an area above 20,000 cpm located at 164205.9E, 1772461.5N.
2. LA Canyon 3WC has an area approaching 10,000 cpm in the vicinity of 1645928.0E, 1771388.7N. LA Canyon 2EC had sporadic locations with readings very near to the nominal 7,000 cpm threshold value.
3. The most recent survey (07 and 08 July 00) of DP Canyon shows trending features with levels above 20,000 cpm. There are areas above 50,000 cpm in the NW and SE of the survey area. In the vicinity of 1633068.1E, 1774644.0N, readings exceeded 75,000 cpm. In the DP Canyon "South" survey there was an elevated area of approximately 0.2 acres trending NW from a point at 1632975.9E, 1774552.0N where the cpm was detected at 92,700.
4. Immediately outside of the SE corner of the Omega West reactor site fence, there was a peak reading of 1,197,900 cpm during the 25 August 00 survey (1628662E, 174110N). This elevated location was remediated and was not evident during the re-survey completed on 17 October 00.
5. The last re-survey (30 June 00) of the LA Canyon remediation site showed two areas above 10,000 cpm: 1637762.6E, 1772966.5N and 1637780.0E, 1773043.0N.
6. The survey of the Omega West reactor site during the period 06 through 16 October 00 indicated several areas of interest, the highest exceeding 200,000 cpm at 1628125.9E, 1774268.1N which is approximately 40 feet WSW of the SW corner of the reactor building.
7. Surveys of the area east of Tech Area 41 buildings and the culvert and ditch adjacent to the gate did not reveal any areas of interest. No areas of interest were discovered at the Mortandad Canyon survey site.
8. The USRADS real-time scanning methods accurately mapped the contaminants and identified the locations of elevated readings in areas with tree canopies, in heavy vegetation and in rough terrain.

2.0 SURVEY RESULTS

The areas were surveyed for gamma radiological characterization using man-carried survey instrumentation interfaced to USRADS. In the following sections, the methods and results of surveying are described with respect to the specific sites by name. Each narrative is followed, where appropriate, by the following attachments in the order noted:

- Color shaded relief maps with points of interest (POIs) labeled with the cpm count - These maps are final result of processing of the survey data. CPM values indicated on the maps are based on gridded data. The nominal threshold over the entire project was set at 7,000 cpm based on background mean plus 3 standard deviations taken from a selected area at Tech Area 02.
- Reacquisition spreadsheet with coordinates of POIs indicate on the relief map - this sheet(s) provide coordinates for the cpm values posted on the companion color shaded relief map.
- Color coded track map - The track map is direct output results from field mapping routines and shows color coded, actual reading values and coverage.
- Signal statistics for the survey data used to create the maps and spreadsheets.

This data is supplied electronically as a complement to this report. In addition, per the client's request, the merged data files for each survey are exported to comma separated value (csv) data files, the names of which include the designation "CSV".

Electronic files and formats:

Merged field data	.dat	
Comma separated values	.dat	(where possible, the letters csv appear in the file name)
Colored shaded map	.jpg	
Reacquisition sheet	.xls	
AutoCAD map	.dwg	

Sections 3.0 through 5.0 describe instrumentation, survey procedures, data evaluation and processing, presentation formats, and quality assurance.

2.1 *LA Canyon*

This section of the report documents the USRADS surveys conducted for selected sites in LA Canyon (LA) near the Los Alamos National Laboratory. The field surveys were conducted in four survey campaigns during the period May through August, 2000. Surveys in LA were completed 26 August, for a total of 21 days in the field dedicated to LA Canyon surveys (including re-surveys of remediated areas). Civil coordinates were provided for translating the USRADS data to site coordinates. Please refer to the supplied maps and data sheets that are included in this section.

On in-house processing at Oak Ridge, CHEMRAD quantified and described an elevated area (approximately 1.5 acres) in LA Canyon in the vicinity of a line between 1641802E, 1772499N and 1642225E, 1772700N. The area displayed counts above 10,000 cpm, with an area above 20,000 cpm located at 164205.9E, 1772461.5N (see enlargement of this area of interest).

Merged field data	.dat	LA509708.dat
Comma separated values	.dat	LA509csv.dat
Colored shaded map	.jpg	LA509.jpg
Reacquisition sheet	.xls	LA509anom.xls

LA Canyon (3WC) has an area approaching 10,000 cpm in the vicinity of 1645928.0E, 1771388.7N.

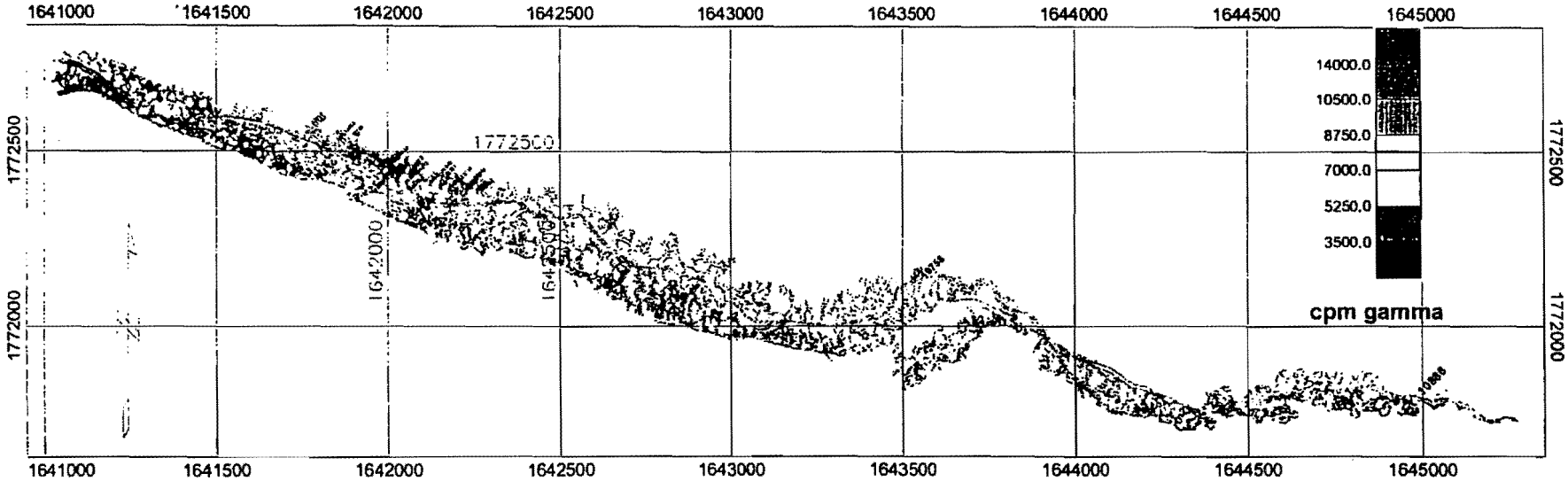
Merged field data	.dat	Lanl3wc.dat
Comma separated values	.dat	3wc_csv.dat
Colored shaded map	.jpg	3WC.jpg
Reacquisition sheet	.xls	3WCanom.xls

Surveying at LA Canyon (2EC) did not indicate any special areas of interest. There were sporadic gridded values just above the threshold.

Merged field data	.dat	Lanl2ec.dat
Comma separated values	.dat	2ec_csv.dat
Colored shaded map	.jpg	2EC.jpg
Reacquisition sheet	.xls	2ECanom.xls

During the period 27 through 30 June, three surveys were conducted over the same site in LA Canyon where a remediation effort was underway. The last re-survey (30 June 00) of the site showed two areas above 10,000 cpm: 1637762.6E, 1772966.5N and 1637780.0E, 1773043.0N. Over the course of the three surveys, the cpm mean significantly improved; it dropped from 8,446 to 5,859.

Merged field data	.dat	lar627m.dat
		lar 628al.dat
		lar 630al.dat
Comma separated values	.dat	lar 630_c.dat
Colored shaded map	.jpg	LAR627.jpg
		LAR628.jpg
		LAR630.jpg
Reacquisition sheet	.xls	LAR630anom.xls



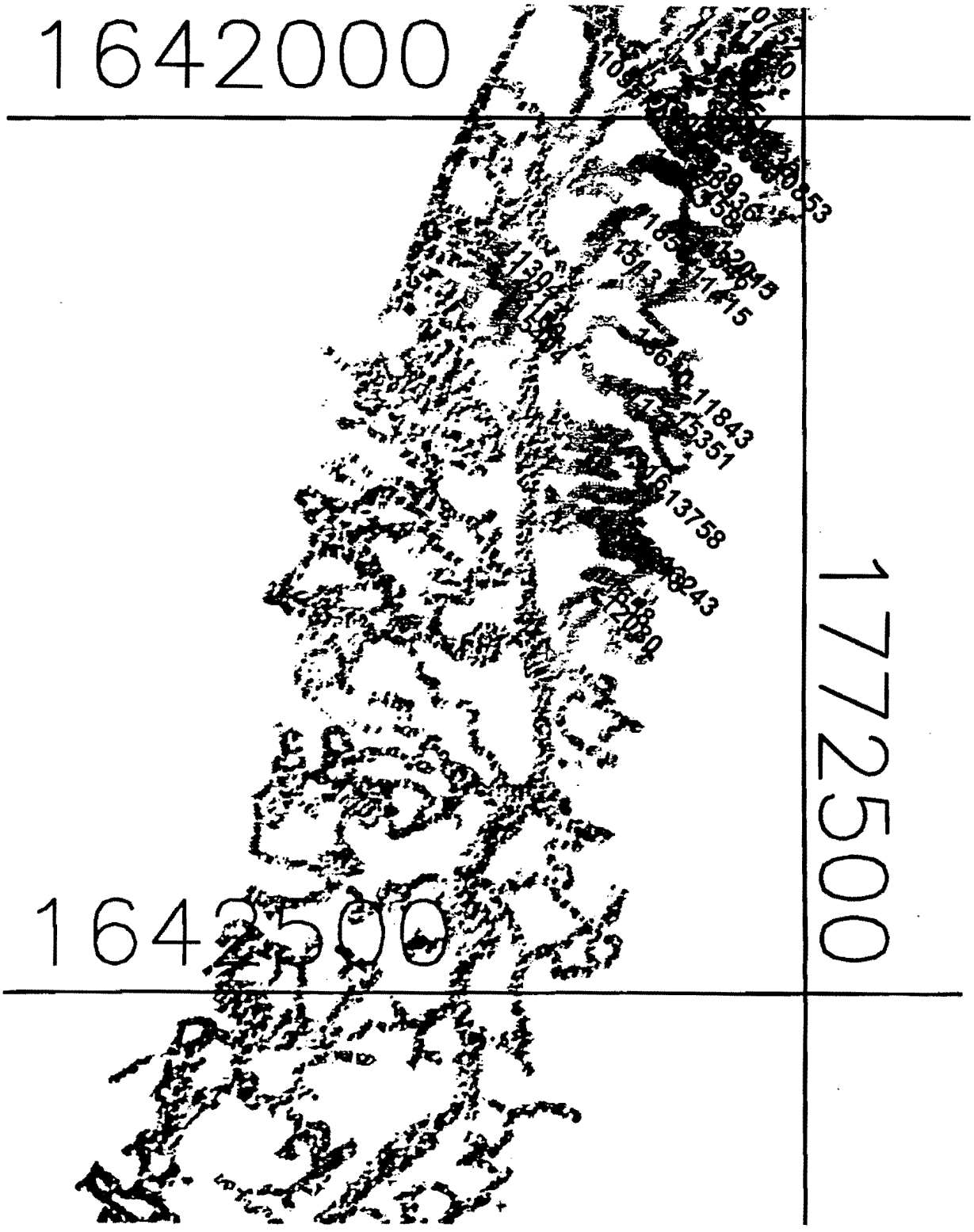
Scale 1:4473.203

0 250 500 750

feet

LANL - Washington Group

LA Canyon Between 2EC and 3WC
NaI 1x1 with USRADS
CHEMRAD LA50970(8) May, 2000


1642000
1642500
1772500

POC	Easting (X)	Northing (Y)	cpm gamma	Reacquisition notes
LA509-1	1641151.0	1772727.0	8801.6	
LA509-2	1641164.5	1772717.5	7710.4	
LA509-3	1641176.3	1772706.5	7514.6	
LA509-4	1641452.9	1772629.9	9596.7	
LA509-5	1641455.6	1772578.7	8944.2	
LA509-6	1641501.1	1772557.5	9204.5	
LA509-7	1641508.1	1772579.8	9130.9	
LA509-8	1641537.5	1772586.0	9705.5	
LA509-9	1641568.8	1772608.3	9062.3	
LA509-10	1641581.7	1772549.1	9292.3	
LA509-11	1641604.2	1772549.6	9870.8	
LA509-12	1641630.8	1772568.5	9253.8	
LA509-13	1641626.7	1772594.2	9866.4	
LA509-14	1641607.0	1772601.9	9334.0	
LA509-15	1641631.9	1772546.1	8968.8	
LA509-16	1641625.9	1772557.7	8904.8	
LA509-17	1641656.2	1772580.6	9182.4	
LA509-18	1641678.5	1772526.8	8951.1	
LA509-19	1641725.9	1772533.5	9379.2	
LA509-20	1641742.7	1772527.2	9646.5	
LA509-21	1641715.8	1772495.1	9812.0	
LA509-22	1641728.5	1772497.4	9024.5	
LA509-23	1641735.4	1772493.1	9802.9	
LA509-24	1641741.6	1772490.6	9788.5	
LA509-25	1641749.5	1772494.7	9432.9	
LA509-26	1641750.6	1772525.9	9470.0	
LA509-27	1641738.1	1772550.2	9660.3	
LA509-28	1641783.0	1772575.3	10615.7	
LA509-29	1641792.0	1772566.0	11164.8	
LA509-30	1641801.2	1772565.4	9080.2	
LA509-31	1641785.3	1772553.2	9514.5	
LA509-32	1641802.0	1772498.5	10802.0	
LA509-33	1641788.7	1772485.8	9933.6	
LA509-34	1641877.8	1772549.6	12954.5	
LA509-35	1641901.3	1772538.6	12168.7	
LA509-36	1641893.0	1772490.2	9983.7	
LA509-37	1641891.6	1772477.4	11484.2	
LA509-38	1641905.4	1772471.6	12659.8	
LA509-39	1641935.5	1772463.6	10751.7	
LA509-40	1641949.1	1772459.7	11350.1	
LA509-41	1642030.3	1772479.5	10853.1	

POC	Easting (X)	Northing (Y)	cpm gamma	Reacquisition notes
LA509-42	1642005.9	1772461.5	20836.4	
LA509-43	1642008.4	1772450.3	17665.5	
LA509-44	1641979.3	1772447.8	13150.6	
LA509-45	1641990.5	1772418.9	13092.9	
LA509-46	1642013.2	1772430.6	14339.1	
LA509-47	1642029.6	1772440.2	18936.0	
LA509-48	1642033.1	1772429.1	17458.2	
LA509-49	1642021.8	1772412.9	14183.2	
LA509-50	1642052.5	1772403.0	11855.8	
LA509-51	1642062.2	1772428.8	13834.1	
LA509-52	1642068.1	1772435.9	14345.5	
LA509-53	1642073.7	1772449.3	12015.1	
LA509-54	1642088.4	1772434.6	11415.1	
LA509-55	1641966.3	1772383.1	10957.4	
LA509-56	1642066.6	1772385.5	11512.8	
LA509-57	1642073.6	1772330.6	11304.4	
LA509-58	1642085.4	1772330.6	12213.2	
LA509-59	1642096.9	1772331.7	13160.1	
LA509-60	1642123.6	1772403.3	13639.9	
LA509-61	1642158.3	1772436.2	11843.2	
LA509-62	1642151.5	1772393.6	11172.5	
LA509-63	1642183.2	1772390.8	14916.2	
LA509-64	1642170.8	1772426.1	15350.9	
LA509-65	1642110.8	1772332.6	15403.5	
LA509-66	1642229.7	1772382.3	14687.3	
LA509-67	1642231.2	1772391.7	15527.5	
LA509-68	1642216.0	1772420.6	13757.7	
LA509-69	1642254.5	1772417.2	16242.7	
LA509-70	1642241.3	1772399.2	14218.2	
LA509-71	1642260.4	1772381.8	11658.1	
LA509-72	1642276.2	1772386.2	12079.9	
LA509-73	1642469.4	1772303.9	7854.7	
LA509-74	1642690.6	1772198.0	7526.8	
LA509-75	1642851.3	1772144.6	7422.1	
LA509-76	1642909.1	1772140.1	7589.7	
LA509-77	1642971.5	1772080.7	7299.6	
LA509-78	1643018.2	1772038.6	8512.7	
LA509-79	1643087.0	1772037.4	8087.4	
LA509-80	1643175.2	1772002.6	7260.1	
LA509-81	1643229.0	1771992.5	7932.9	
LA509-82	1643410.6	1772006.7	7855.0	

POC	Easting (X)	Northing (Y)	cpm gamma	Reacquisition notes
LA509-83	1643420.3	1772030.5	8038.0	
LA509-84	1643439.4	1772058.5	7917.4	
LA509-85	1643471.3	1772105.0	7904.1	
LA509-86	1643498.0	1772092.1	8869.7	
LA509-87	1643513.4	1772104.6	9709.5	
LA509-88	1643559.2	1772127.5	10758.0	
LA509-89	1643608.2	1772121.3	9012.6	
LA509-90	1643654.6	1772109.0	7296.2	
LA509-91	1643833.5	1772057.4	7279.7	
LA509-92	1643974.0	1771929.5	8812.0	
LA509-93	1644153.9	1771814.2	7710.4	
LA509-94	1644122.0	1771770.1	8236.1	
LA509-95	1644158.4	1771781.5	8278.9	
LA509-96	1644239.0	1771786.4	7834.6	
LA509-97	1644238.9	1771774.9	8470.6	
LA509-98	1644253.1	1771766.7	8250.0	
LA509-99	1644427.0	1771784.0	7407.5	
LA509-100	1644504.3	1771780.2	7615.2	
LA509-101	1644539.7	1771793.7	7498.5	
LA509-102	1644583.1	1771804.7	7561.7	
LA509-103	1644646.1	1771812.8	7273.7	
LA509-104	1644715.0	1771805.6	7713.5	
LA509-105	1644748.7	1771822.9	8104.8	
LA509-106	1644785.8	1771824.4	9047.4	
LA509-107	1644828.3	1771832.9	9118.2	
LA509-108	1644870.1	1771819.7	7750.1	
LA509-109	1644907.9	1771795.8	7379.6	
LA509-110	1644935.9	1771806.5	7500.4	
LA509-111	1644989.0	1771797.1	10886.2	
LA509-112	1644986.2	1771781.4	8074.8	
LA509-113	1645060.7	1771786.5	7576.9	
LA509-114	1645091.3	1771784.9	7603.7	
LA509-115	1645107.6	1771777.3	7847.3	
LA509-116	1645118.3	1771771.0	7583.8	
LA509-117	1645149.8	1771749.9	8320.3	
LA509-118	1645159.2	1771744.0	8353.6	

Notes:

LOGGER Analyze v1.54m Track Map

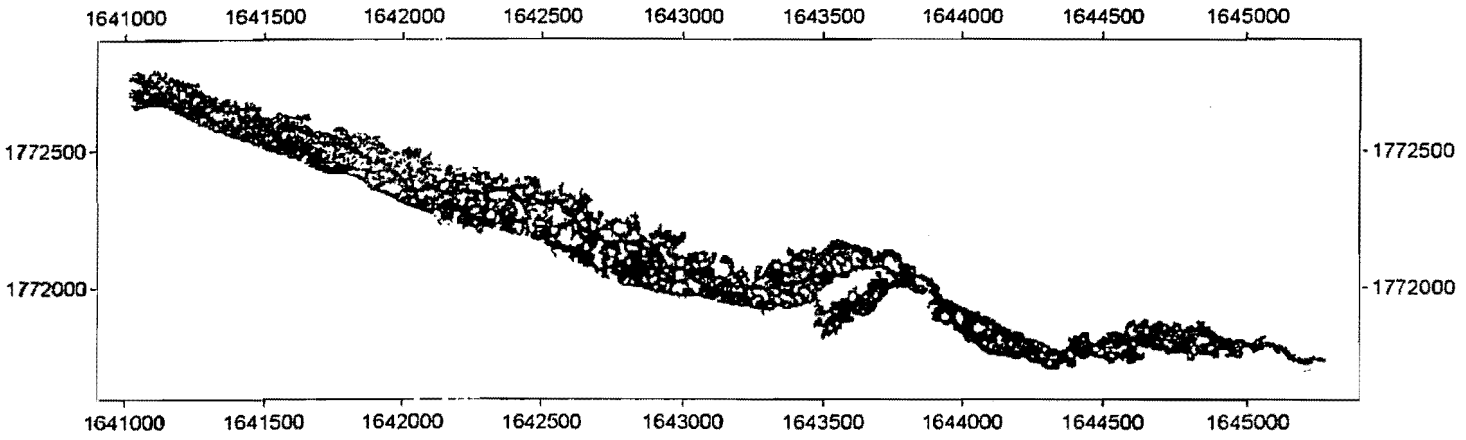
Site: LA50970 (8)

Signal: NaI 1x1 (cpm)

Time:

Threshold:
> 7000

< 7000
7000 to 8750
8750 to 10500
10500 to 12250
12250 to 14000
14000 to 15750
15750 to 17500
> 17500

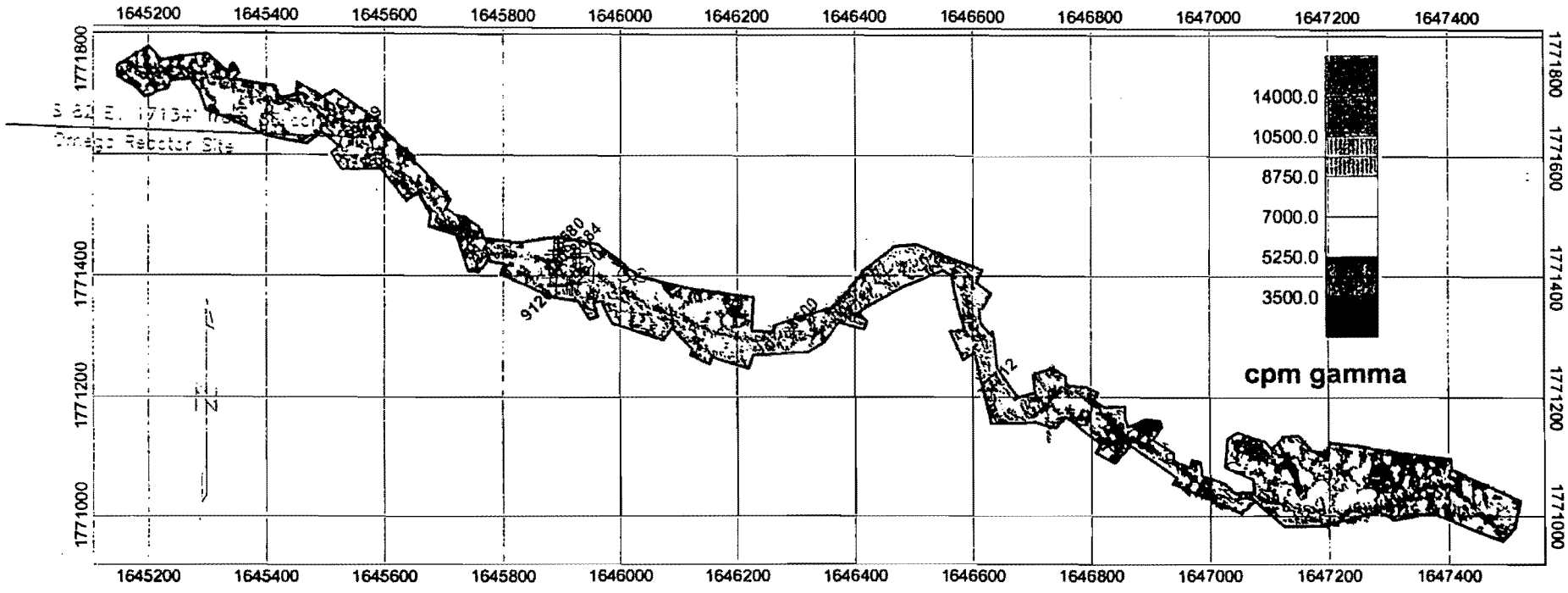


Analysis Limits

X 1641023 to 1645278
Y 1771703 to 1772790

Signal Statistics

Signal	Low	High	Mean	Std Dev
NaI 1x1	500.6	21384	5670.889	1374.081



Scale 1:2494.105

100 0 100 200 300 400

feet

LANL - Washington Group

LA Canyon, 3WC
NaI 1x1 with USRADS
CHEMRAD LANL3WC.DAT August, 2000

POC	Easting (X)	Northing (Y)	cpm gamma	Reacquisition notes
3WC-1	1645553.9	1771626.7	9269.0	
3WC-2	1645896.3	1771440.8	8580.3	
3WC-3	1645880.7	1771397.3	8808.5	
3WC-4	1645924.9	1771431.7	8683.6	
3WC-5	1645890.7	1771386.7	9120.1	
3WC-6	1645928.0	1771388.7	9609.7	
3WC-7	1646296.1	1771307.9	8599.9	
3WC-8	1646633.3	1771208.3	7712.0	

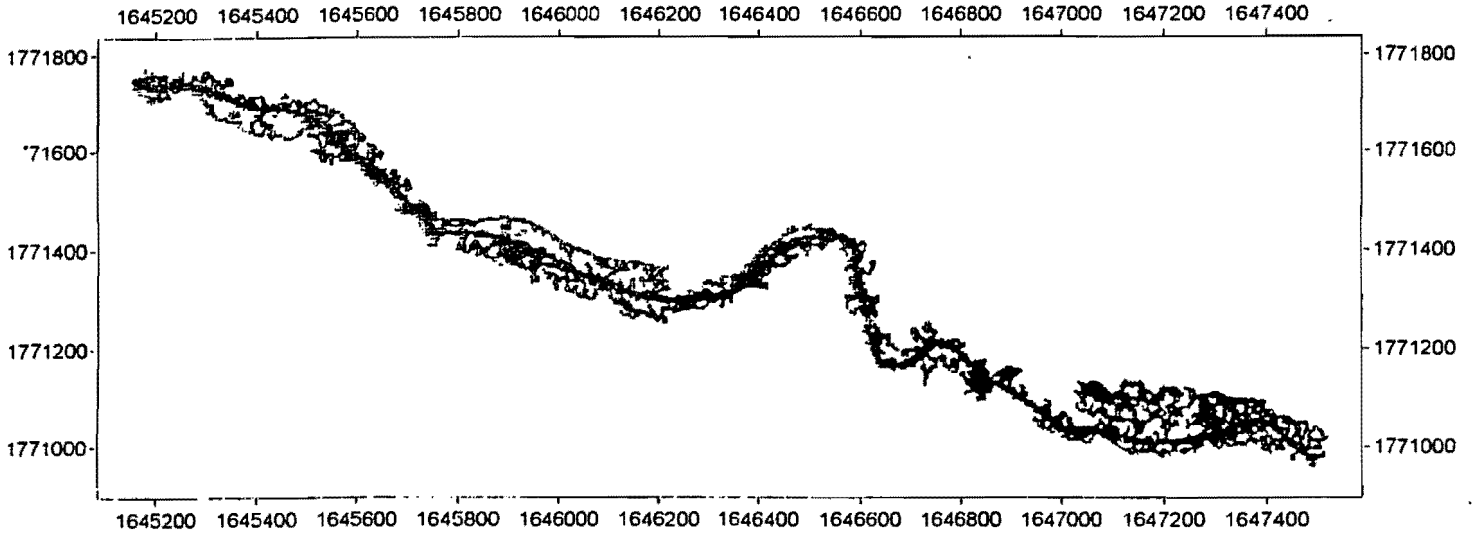
Notes:

LOGGER Analyze v1.54m Track Map

Site: LANL3WC () **Signal: NaI 1x1 (cpm)** **Time:**

Threshold:
> 7000

< 7000	12250 to 14000
7000 to 8750	14000 to 15750
8750 to 10500	15750 to 17500
10500 to 12250	> 17500



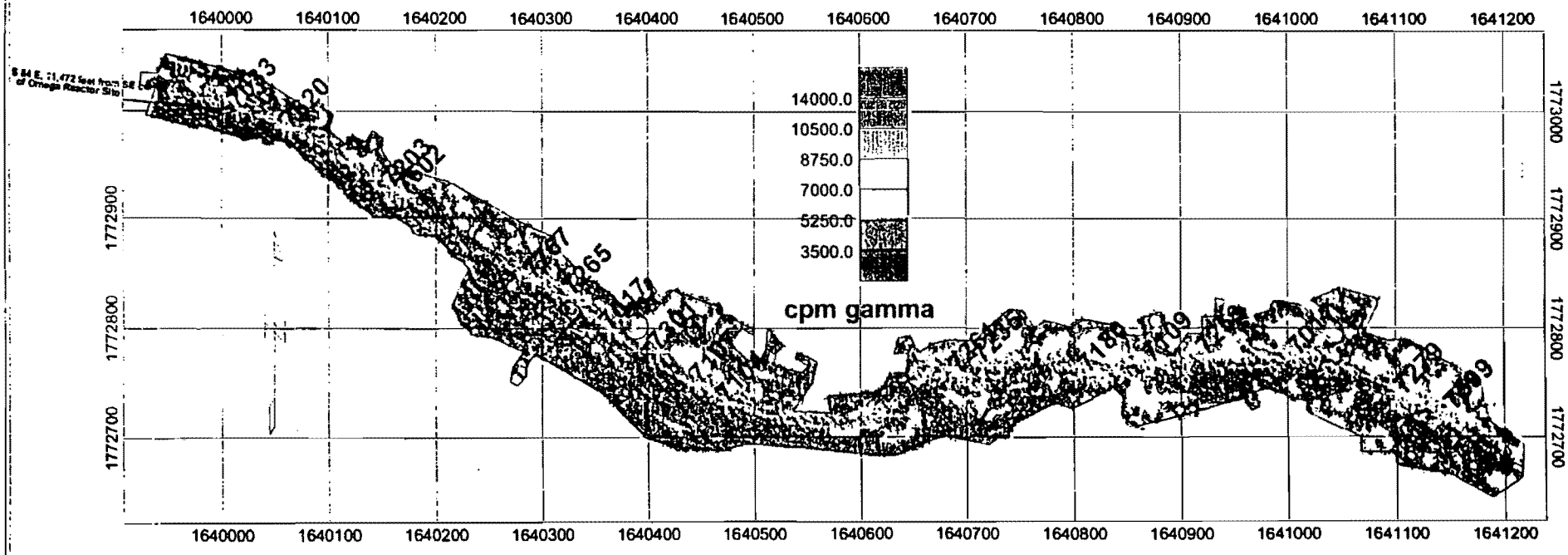
LOGGER Analyze v1.54m Site: LANL3WC () Time:

Analysis Limits

X 1645146 to 1647519
Y 1770960 to 1771770

Signal Statistics

Signal	Low	High	Mean	Std Dev
NaI 1x1	100	9900	1477.847	1968.681



Scale 1:1352.681

50 0 50 100 150 200 250

feet

LANL - Washington Group

LA Canyon 2EC
NaI 1x1 with USRADS
CHEMRAD LANL2EC.DAT August, 2000

POC	Easting (X)	Northing (Y)	cpm gamma	Reacquisition Notes
2EC-1	1640015	1773000	7033	
2EC-2	1640065	1772982	7620	
2EC-3	1640160	1772926	7203	
2EC-4	1640172	1772920	7602	
2EC-5	1640292	1772843	7767	
2EC-6	1640329	1772828	7265	
2EC-7	1640364	1772797	7017	
2EC-8	1640410	1772778	7301	
2EC-9	1640449	1772749	7107	
2EC-10	1640474	1772731	7104	
2EC-11	1640693	1772757	7261	
2EC-12	1640716	1772766	7235	
2EC-13	1640814	1772758	7180	
2EC-14	1640874	1772767	7109	
2EC-15	1640924	1772773	7253	
2EC-16	1641010	1772773	7017	
2EC-17	1641108	1772738	7279	
2EC-18	1641154	1772723	7599	

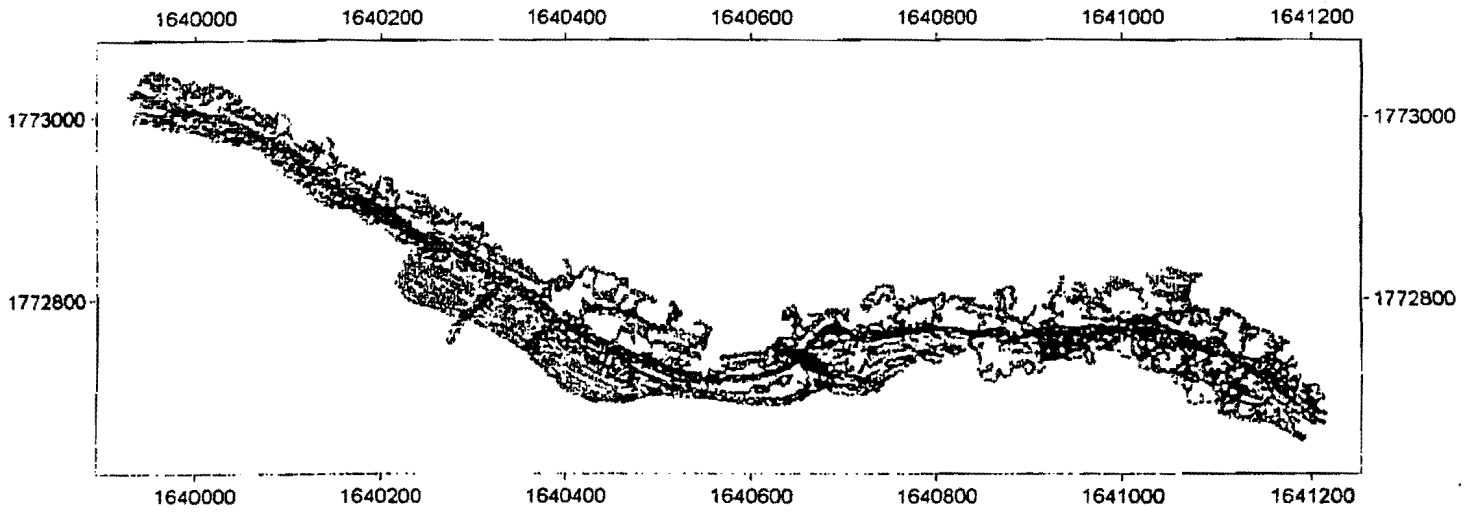
Notes:

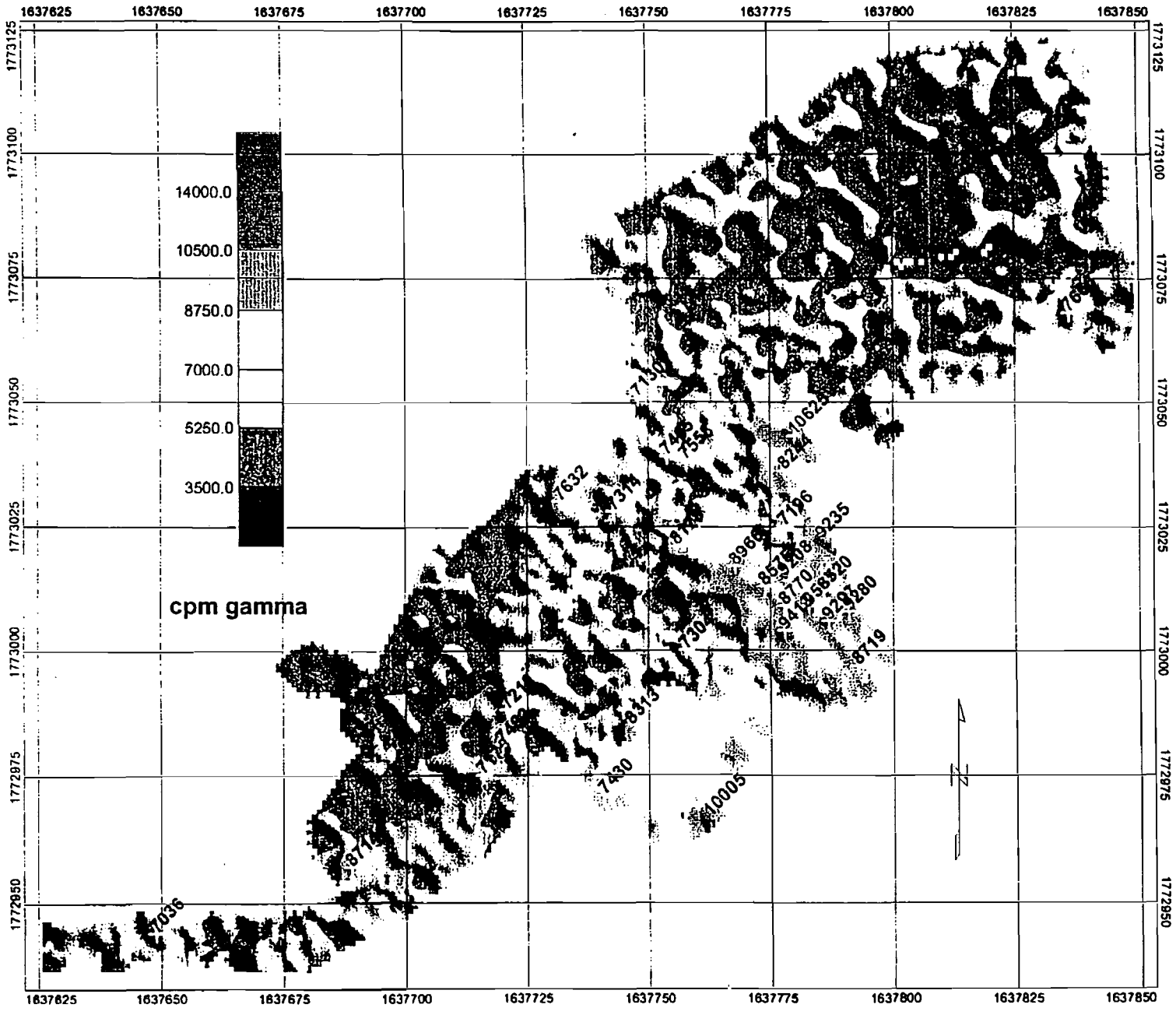
LOGGER Analyze v1.54m Track Map

Site: LANL2EC () **Signal: NaI 1x1 (cpm)** **Time:**

Threshold:
> 7000

< 7000	**12250 to 14000**
7000 to 8750	**14000 to 15750**
8750 to 10500	**15750 to 17500**
10500 to 12250	**> 17500**





Scale 1:234.3807

10 0 10 20 30 40

feet

LANL - Washington Group

LA Canyon Remediation Survey
NaI 1x1 with USRADS
CHEMRAD LAR630A(L) 30JUN00

Analysis Limits

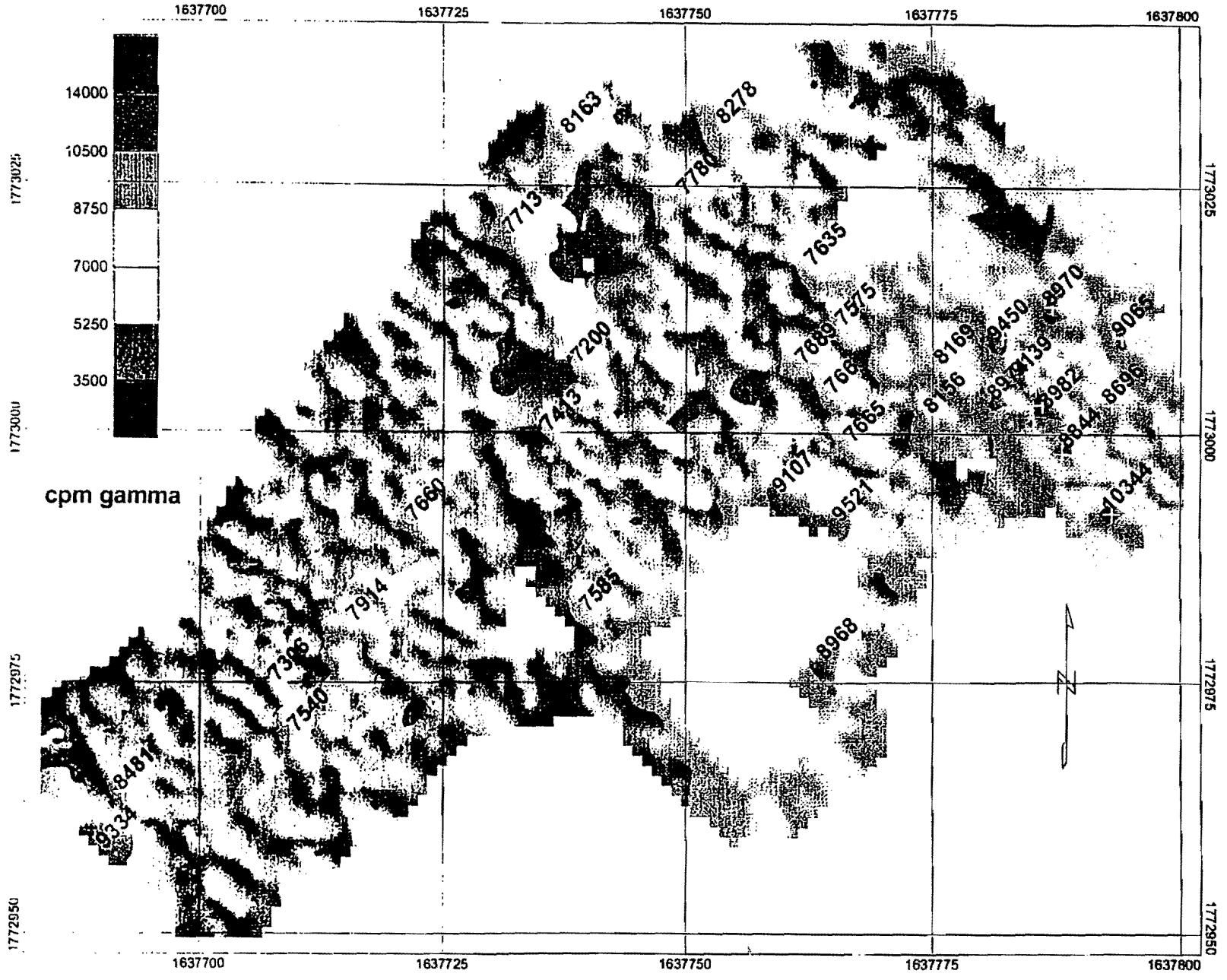
X 1639929 to 1641216
Y 1772644 to 1773052

Signal Statistics

Signal	Low	High	Mean	Std Dev
NaI 1x1	2940	9000	5147.761	752.4432

POC	Easting (X)	Northing (Y)	cpm gamma	Reacquisition notes
LAR630-1	1637649.0	1772944.0	7035.5	
LAR630-2	1637689.0	1772957.0	8714.1	
LAR630-3	1637715.9	1772975.0	7175.2	
LAR630-4	1637720.0	1772981.1	7482.0	
LAR630-5	1637721.0	1772988.0	7209.6	
LAR630-6	1637746.6	1772984.9	8312.7	
LAR630-7	1637741.0	1772971.1	7429.7	
LAR630-8	1637762.6	1772966.5	10004.6	
LAR630-9	1637758.0	1773000.0	7304.1	
LAR630-10	1637793.0	1772997.0	8718.6	
LAR630-11	1637778.1	1773004.0	9413.4	
LAR630-12	1637787.0	1773006.0	9296.9	
LAR630-13	1637791.1	1773008.0	9279.8	
LAR630-14	1637778.1	1773009.0	8769.6	
LAR630-15	1637783.0	1773009.0	9567.2	
LAR630-16	1637786.0	1773012.0	8520.0	
LAR630-17	1637756.0	1773021.1	8178.2	
LAR630-18	1637768.0	1773017.0	8965.9	
LAR630-19	1637774.0	1773013.0	8574.8	
LAR630-20	1637777.9	1773014.9	9207.6	
LAR630-21	1637785.5	1773022.5	9234.6	
LAR630-22	1637778.0	1773025.0	7195.7	
LAR630-23	1637732.0	1773030.0	7631.5	
LAR630-24	1637743.0	1773028.0	7313.6	
LAR630-25	1637754.0	1773039.0	7465.0	
LAR630-26	1637757.9	1773038.0	7557.6	
LAR630-27	1637778.0	1773036.1	8243.5	
LAR630-28	1637780.0	1773043.0	10625.1	
LAR630-29	1637748.0	1773051.0	7130.2	
LAR630-30	1637836.0	1773068.1	7665.8	

Note:

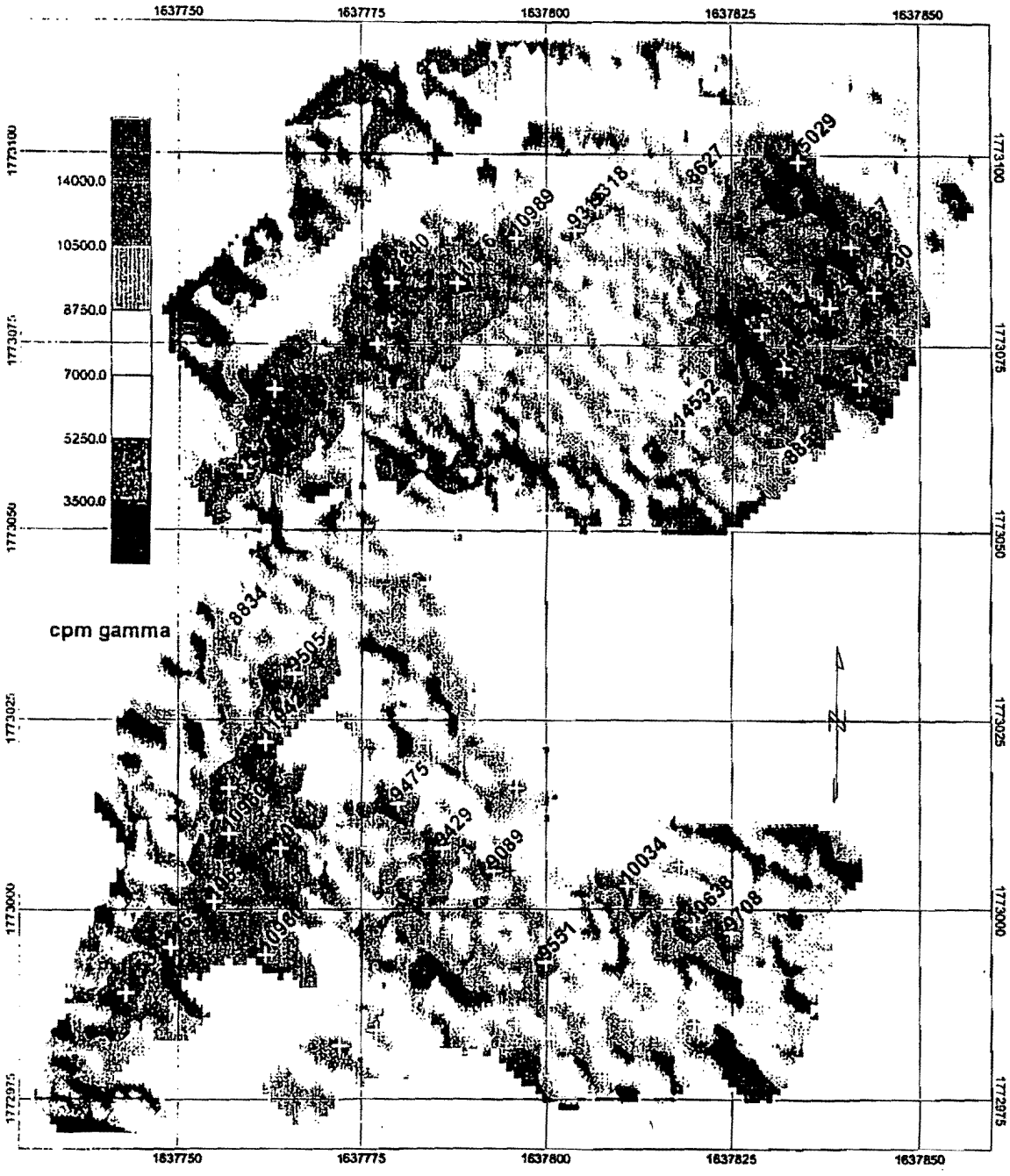


Scale 1:121.92

5 0 5 10 15 20

LANL - Washington Group

LA Canyon Remediation Survey
NaI 1x1 with USRADS
CHEMRAD LAR628A(L).dat 28JUN00



LANL - Washington Group

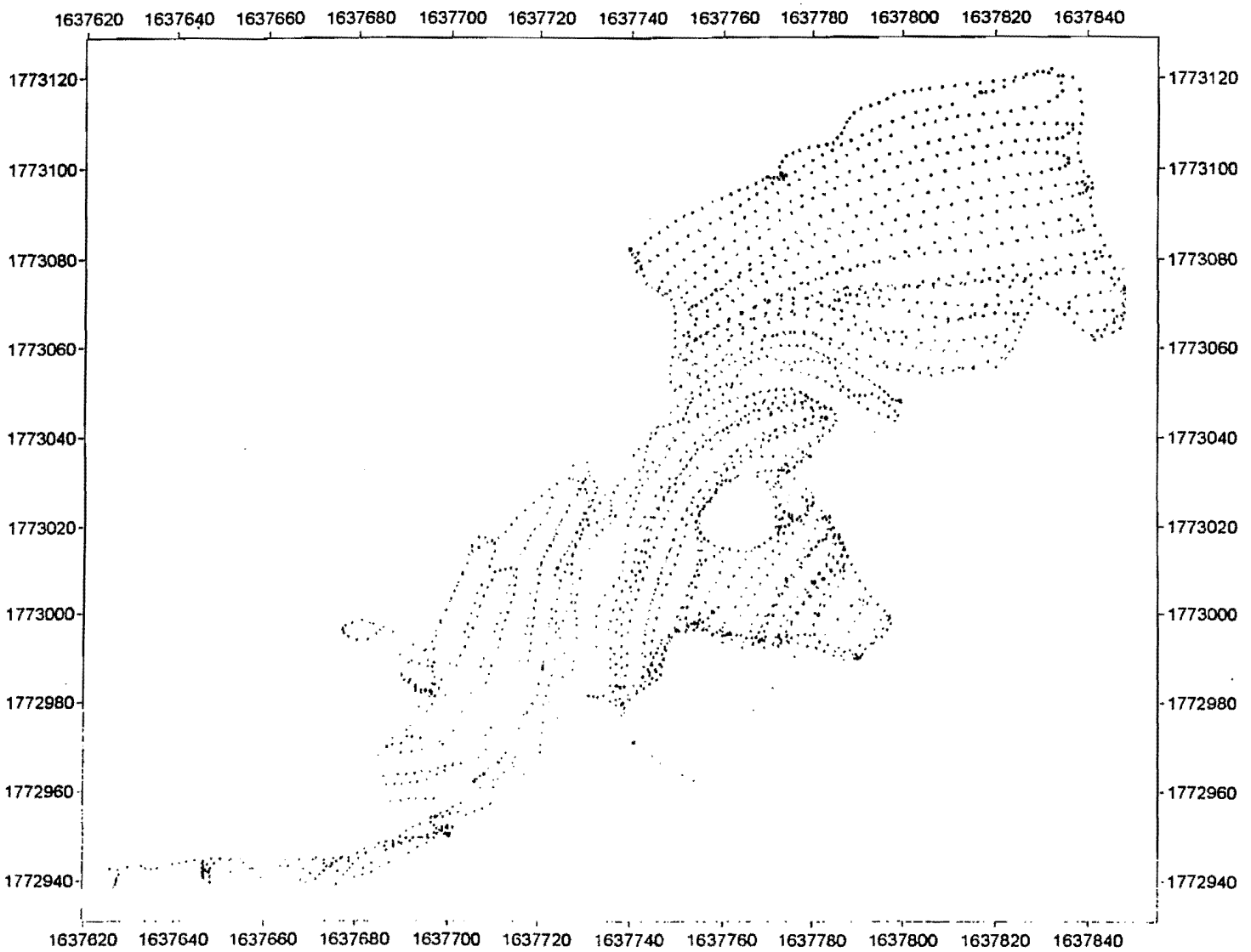
LA Canyon Remediation Survey
NaI 1x1 with USRADS
CHEMRAD LAR627(M).DAT 27JUN00

LOGGER Analyze v1.54m Track Map

Site: LAR630_ (C) **Signal: NaI 1x1 (cpm)** **Time:**

Threshold:
> 7000 •

< 7000	**12250 to 14000**
7000 to 8750	**14000 to 15750**
8750 to 10500	**15750 to 17500**
10500 to 12250	**> 17500**



Analysis Limits

X 1637626 to 1637848
Y 1772938 to 1773122

Signal Statistics

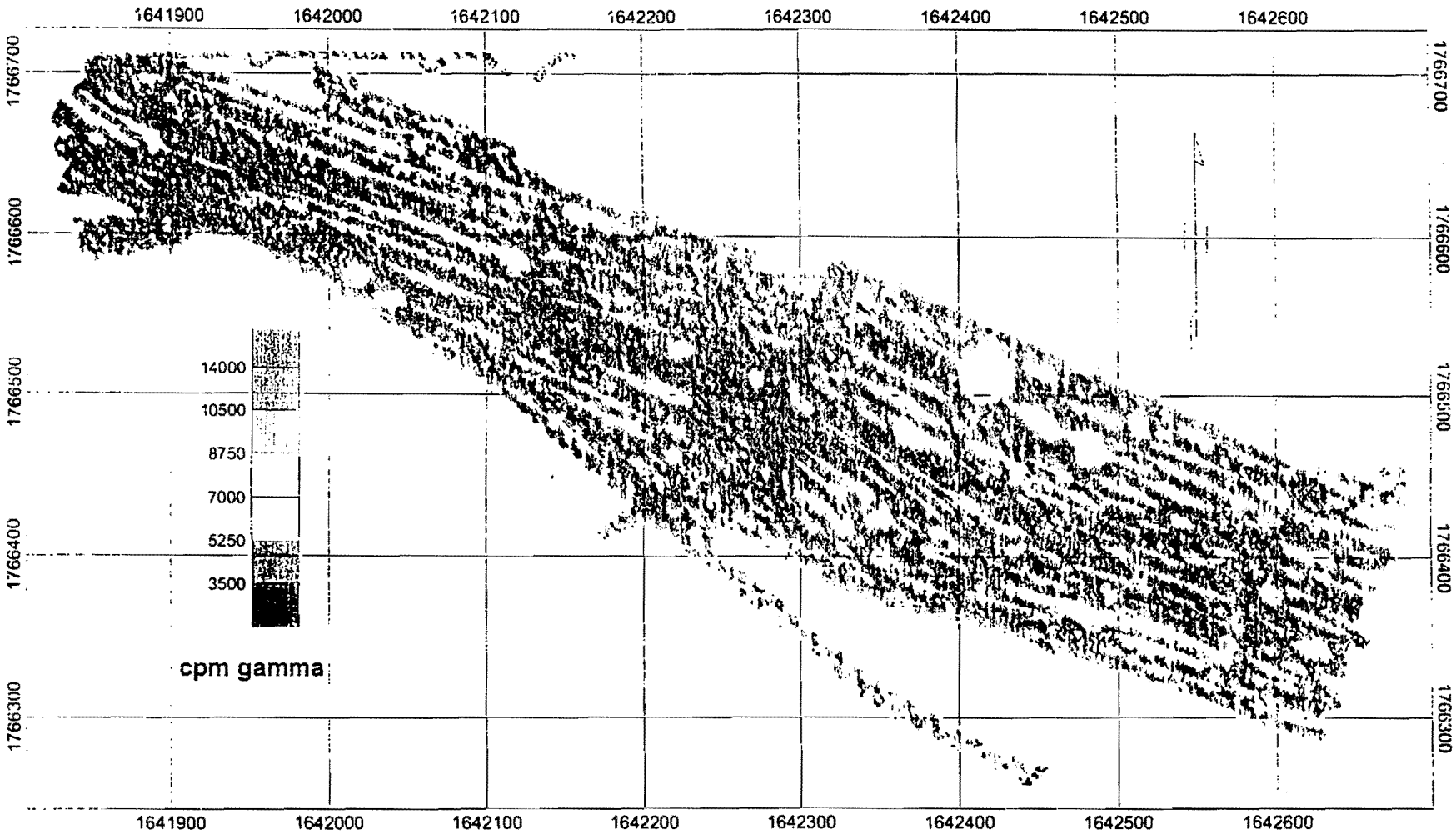
Signal	Low	High	Mean	Std Dev
NaI 1x1	1	9840	165.1644	928.598

2.2 *Mortandad Canyon*

This section of the report documents the USRADS surveys conducted for the Mortandad Canyon site. The field survey was conducted on 03 July 00. Civil survey coordinates were provided to translate the USRADS data to site coordinates.

There were no significant points of interest indicated from the processing of the field data.

Merged field data	.dat	mort070.dat
Comma separated values	.dat	mort_csv.dat
Colored shaded map	.jpg	MORT.jpg
Reacquisition sheet	.xls	(none)



Scale 1:1000

50 0 50 100 150

feet

LANL - Washington Group

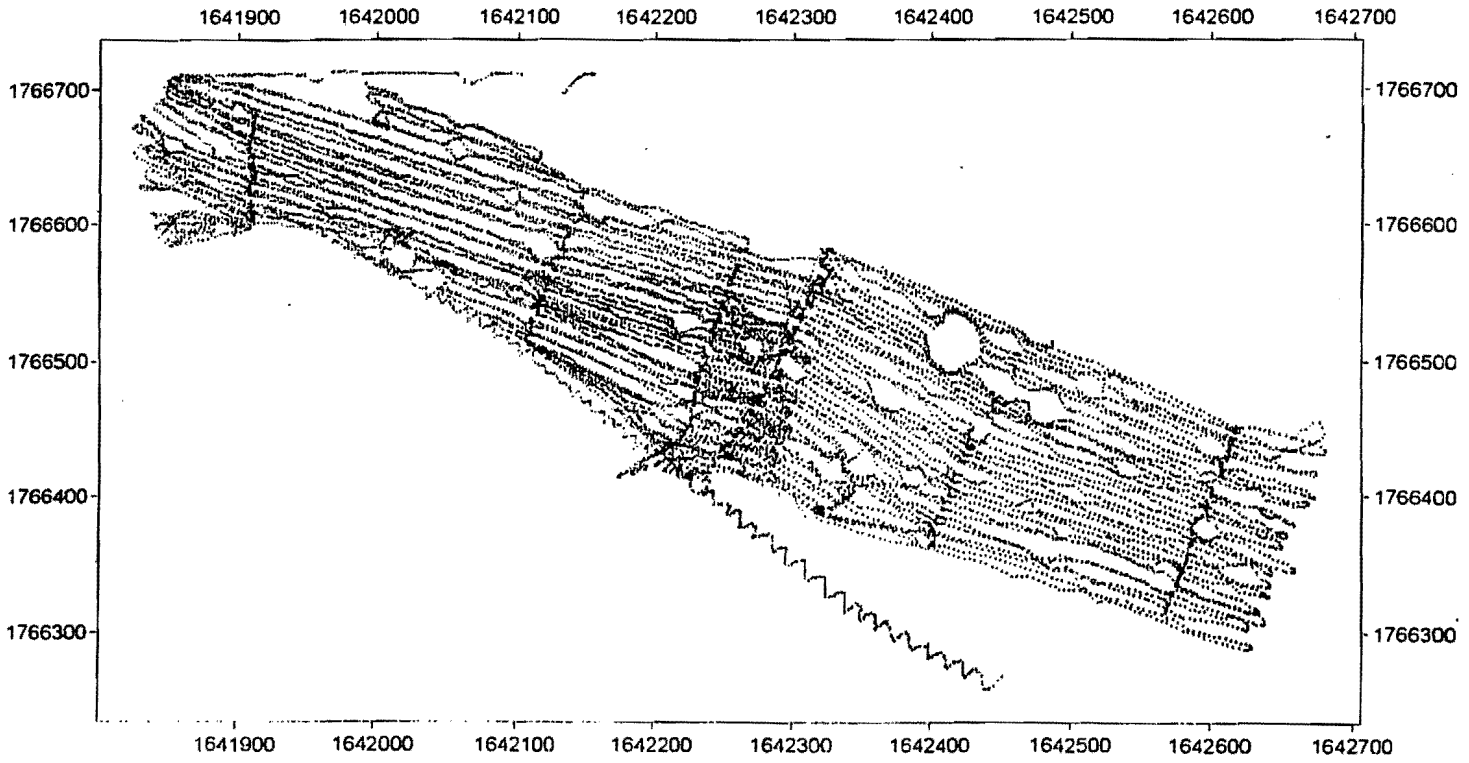
Mortandad Canyon Survey
NaI 1x1 with USRADS
CHEMRAD MORT070.DAT 03JUL00

LOGGER Analyze v1.54m Track Map

Site: MORT070 () **Signal: NaI 1x1 (cpm)** **Time:**

Threshold:
> 7000

< 7000	**12250 to 14000**
7000 to 8750	**14000 to 15750**
8750 to 10500	**15750 to 17500**
10500 to 12250	**> 17500**



2.3 *DP Canyon*

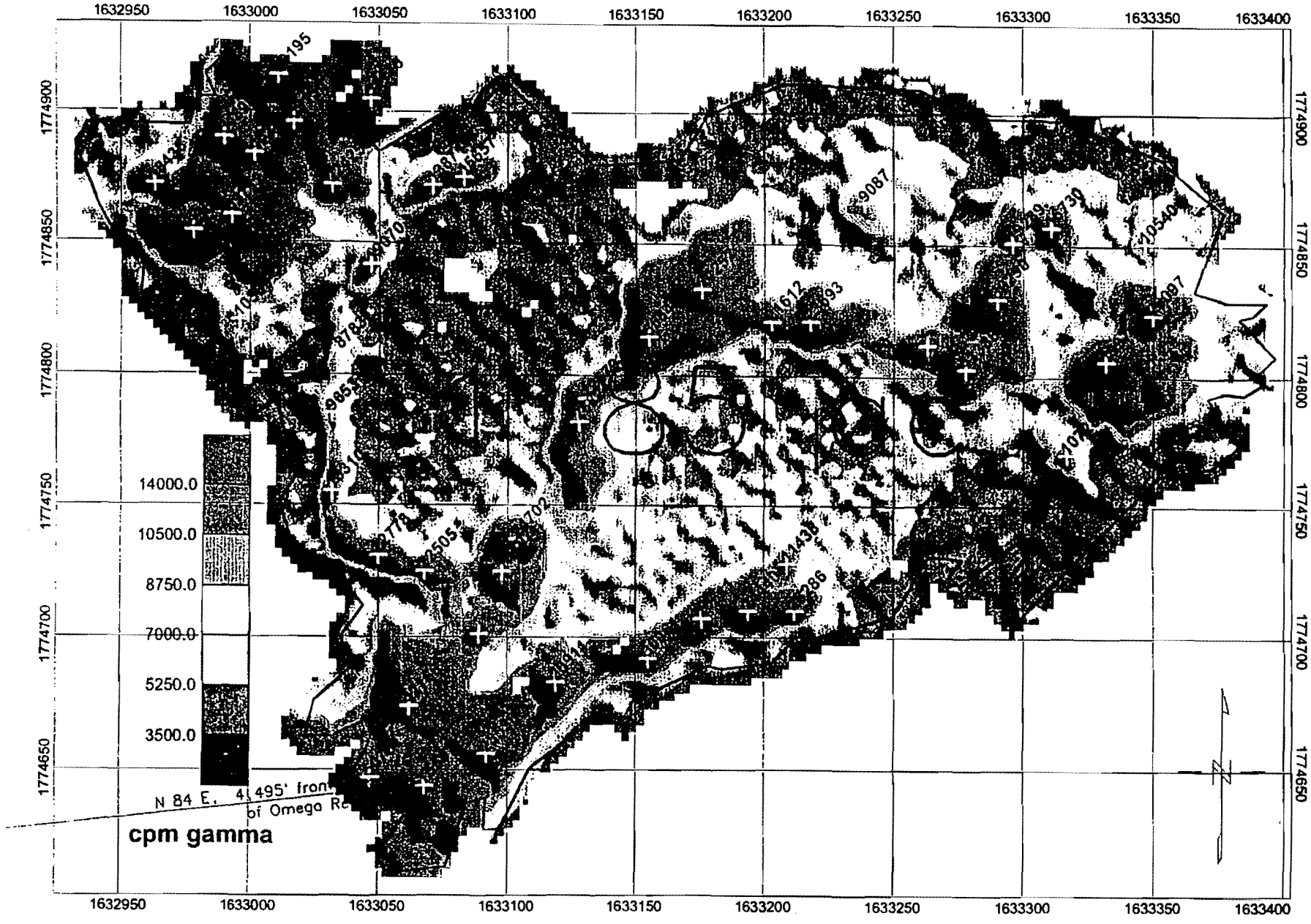
This section of the report documents the USRADS surveys conducted for selected sites in DP Canyon near Los Alamos National Laboratory TA-21. The field surveys were conducted on 07 and 08 July 00. Civil surveys were provided to translate the USRADS data into state plane coordinates. The survey data are separated into two areas "DPTRANS" which represents the northern, lower site and "DPSOUTH" which represents the southern, upper site.

The survey of the northern site at DP Canyon showed trending features with levels above 20,000 cpm. There are areas above 50,000 cpm in the NW and SE portions of the survey area. In the vicinity of 1633068.1E, 1774644.0N, readings exceeded 75,000 cpm.

Merged field data	.dat	dptransl.dat
Comma separated values	.dat	dpt_csv.dat
Colored shaded map	.jpg	DP_CAN.jpg
Reacquisition sheet	.xls	DP_CAN.xls

In the DP Canyon "South" survey there was an elevated area of approximately 0.2 acres trending NW from a point at 1632975.9E, 1774552.0N where the cpm was detected at 92,700.

Merged field data	.dat	dpsouth.dat
Comma separated values	.dat	dps_csv.dat
Colored shaded map	.jpg	DPSOUTH.jpg
Reacquisition sheet	.xls	DPSOanom.xls


1632950
1633000
1633050
1633100
1633150
1633200
1633250
1633300
1633350
1633400
1774900
1774850
1774800
1774750
1774700
1774650
14000.0
10500.0
8750.0
7000.0
5250.0
3500.0
cpm gamma
N 84 E, 4
of Omega R
Scale 1:1593.103
25 0 25 50 75
metres
LANL - Washington Group
DP Canyon
Nal 1x1 with USRADS
CHEMRAD DPTRANS.DAT 6&7 JUL 00

POC	Easting (X)	Northing (Y)	cpm gamma	Reacquisition notes
DPC-1	1633047.0	1774646.9	50781.0	
DPC-2	1633062.0	1774674.1	42166.1	
DPC-3	1633068.1	1774644.0	75697.3	
DPC-4	1633092.0	1774656.0	28529.5	
DPC-5	1633119.2	1774683.1	20911.0	
DPC-6	1633155.0	1774692.0	30061.4	
DPC-7	1633176.1	1774707.1	23510.6	
DPC-8	1633194.1	1774710.0	24439.8	
DPC-9	1633212.0	1774710.0	26285.5	
DPC-10	1633209.0	1774728.1	11437.9	
DPC-11	1633317.0	1774770.1	10727.7	
DPC-12	1633278.0	1774803.1	41387.5	
DPC-13	1633289.8	1774830.0	30290.3	
DPC-14	1633332.0	1774806.0	19970.7	
DPC-15	1633350.0	1774824.1	20096.7	
DPC-16	1633296.0	1774851.1	19288.8	
DPC-17	1633310.9	1774857.1	16730.1	
DPC-18	1633347.0	1774851.1	10540.3	
DPC-19	1633128.0	1774782.0	25823.8	
DPC-20	1633131.0	1774791.1	22579.1	
DPC-21	1633155.0	1774815.0	35841.7	
DPC-22	1633176.1	1774833.0	24251.9	
DPC-23	1633203.0	1774820.9	21611.8	
DPC-24	1633218.0	1774821.1	23692.9	
DPC-25	1633104.0	1774737.0	24702.3	
DPC-26	1633097.9	1774725.1	19496.6	
DPC-27	1633068.0	1774725.1	22505.3	
DPC-28	1633050.0	1774731.0	22777.8	
DPC-29	1633032.0	1774755.2	13310.2	
DPC-30	1633032.1	1774785.1	9652.7	
DPC-31	1633035.1	1774809.1	8782.8	
DPC-32	1633047.1	1774842.0	19069.5	
DPC-33	1633071.0	1774872.1	13871.4	
DPC-34	1633083.0	1774875.0	15657.1	
DPC-35	1632996.0	1774821.0	10308.7	
DPC-36	1633032.0	1774871.9	22424.5	
DPC-37	1632962.9	1774872.1	18435.9	
DPC-38	1632978.1	1774854.0	59515.7	
DPC-39	1632993.0	1774860.0	43711.5	
DPC-40	1633002.0	1774883.9	46231.3	
DPC-41	1632990.0	1774890.1	34899.3	
DPC-42	1633016.9	1774896.2	39155.6	
DPC-43	1633047.0	1774905.2	38169.5	
DPC-44	1633011.0	1774914.1	29195.2	
DPC-45	1633239.0	1774866.1	9086.8	

Notes:

LOGGER Analyze v1.54m Track Map

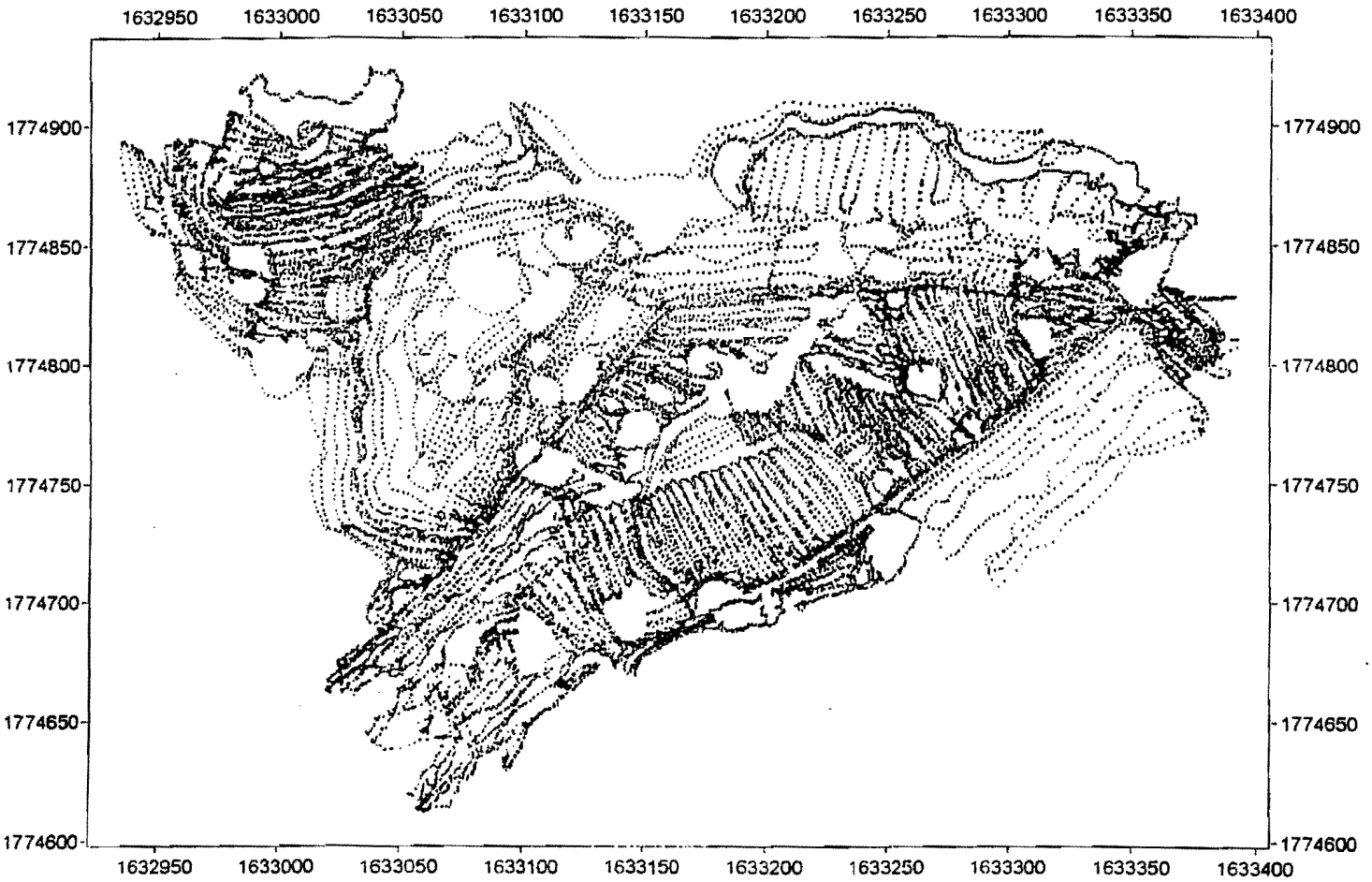
Site: DPTRANS (L)

Signal: NaI 1x1 (cpm)

Time:

Threshold:
> 7000

< 7000	12250 to 14000
7000 to 8750	14000 to 15750
8750 to 10500	15750 to 17500
10500 to 12250	> 17500



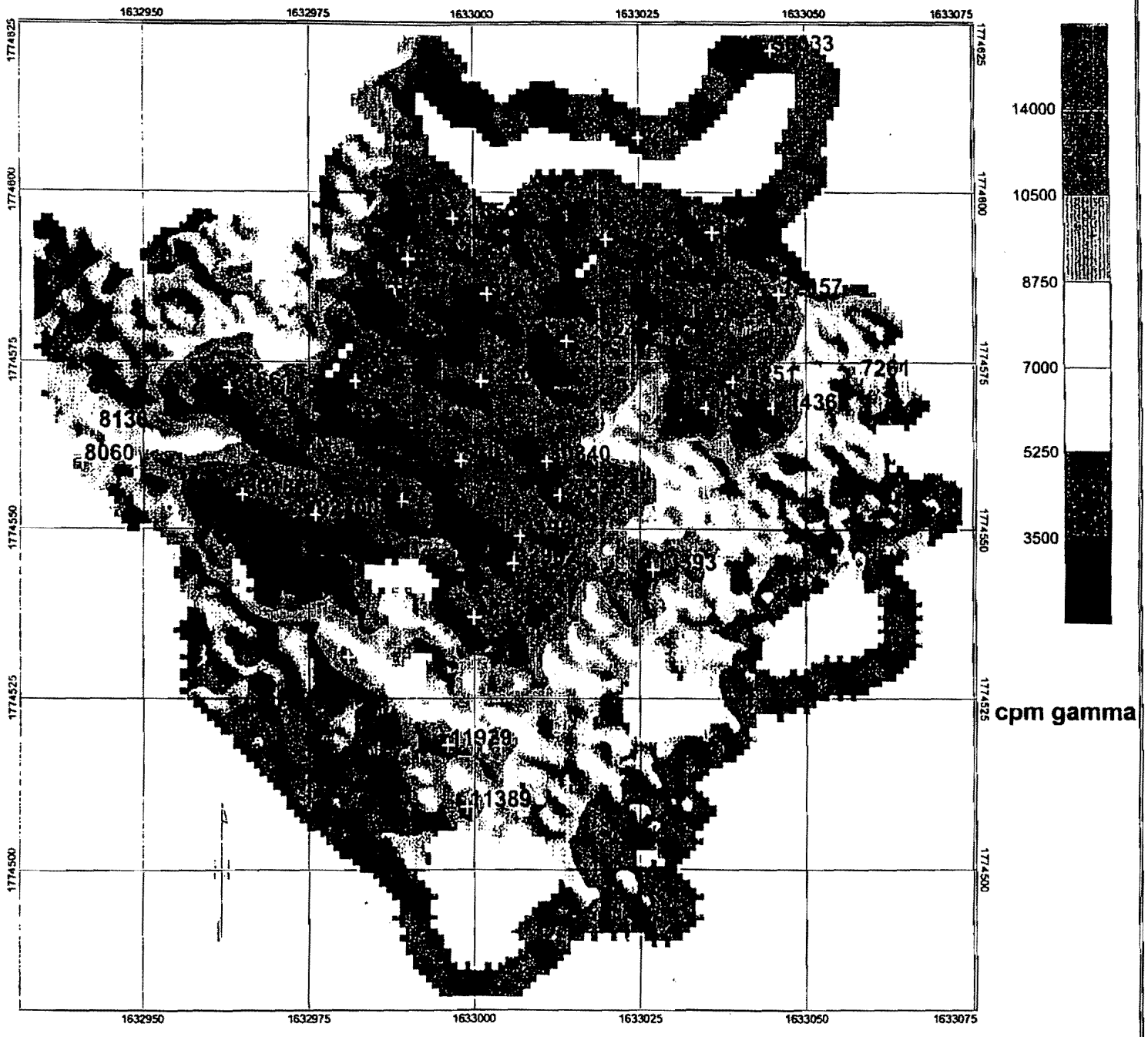
11277.9689

Analysis Limits

X 1632934 to 1633393
Y 1774612 to 1774925

Signal Statistics

Signal	Low	High	Mean	Std Dev
NaI 1x1	1002	76020	5986.095	4760.24


1632950
1632975
1633000
1633025
1633050
1633075
1774825
1774800
1774575
1774550
1774525
1774500
14000
10500
8750
7000
5250
3500
cpm gamma
8060
11929
1389
Scale 1:148.1959
LANL - Washington Group
DP Canyon South
NaI 1x1 with USRADS
CHEMRAD DPSOUTH.DAT 07.JUL.00

POC	Easting (X)	Northing (Y)	cpm gamma	Reacquisition notes
DPSO-1	1632975.9	1774552.0	92700.0	
DPSO-2	1632999.0	1774509.0	11389.0	
DPSO-3	1632996.0	1774518.0	11929.3	
DPSO-4	1633000.0	1774536.9	40184.5	
DPSO-5	1633006.0	1774545.0	32962.0	
DPSO-6	1633007.0	1774549.0	31984.7	
DPSO-7	1633027.0	1774544.0	13392.8	
DPSO-8	1633058.0	1774573.0	7260.7	
DPSO-9	1633045.0	1774567.9	21436.0	
DPSO-10	1633035.0	1774568.0	24168.4	
DPSO-11	1633039.0	1774572.0	24250.5	
DPSO-12	1633013.0	1774555.0	27597.6	
DPSO-13	1633011.0	1774560.0	30839.8	
DPSO-14	1633001.0	1774572.0	43308.6	
DPSO-15	1632998.0	1774560.1	53017.7	
DPSO-16	1632989.0	1774554.0	67235.8	
DPSO-17	1632982.0	1774572.0	33626.6	
DPSO-18	1632965.0	1774555.0	30186.3	
DPSO-19	1632963.0	1774571.0	21661.1	
DPSO-20	1632943.0	1774565.0	8136.3	
DPSO-21	1632940.9	1774560.0	8060.1	
DPSO-22	1632986.7	1774585.8	45716.5	
DPSO-23	1632990.0	1774590.0	44836.9	
DPSO-24	1633002.0	1774585.0	59271.1	
DPSO-25	1632997.0	1774596.0	31856.2	
DPSO-26	1633015.0	1774578.5	32924.0	
DPSO-27	1633020.0	1774593.0	43762.7	
DPSO-28	1633036.0	1774594.0	18452.2	
DPSO-29	1633046.0	1774585.0	12056.9	
DPSO-30	1633025.0	1774608.0	32179.5	
DPSO-31	1633045.0	1774621.0	50033.1	

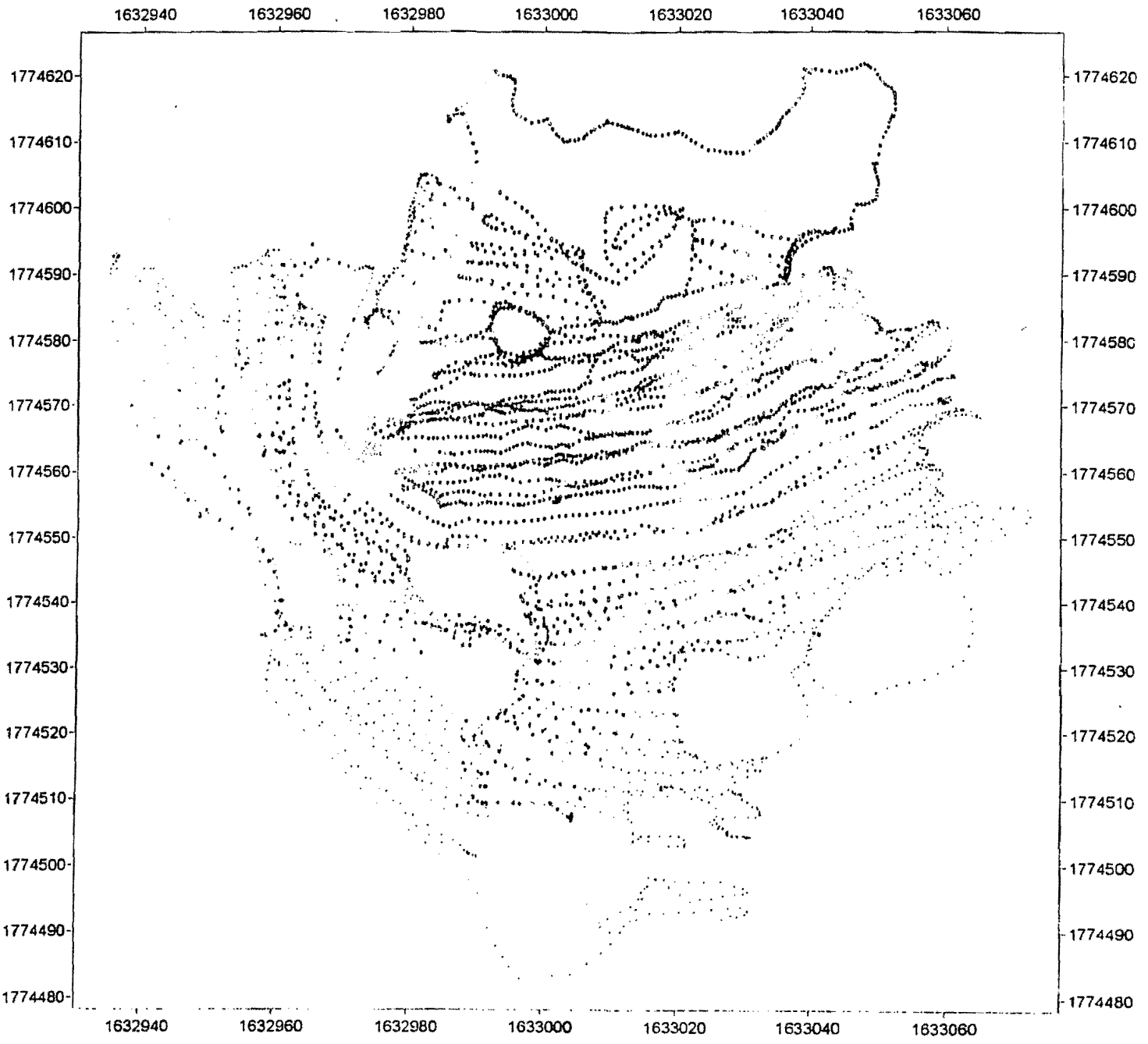
Notes:

LOGGER Analyze v1.54m Track Map

Site: DPSOUTH () **Signal: NaI 1x1 (cpm)** **Time:**

Threshold:
> 7000

< 7000	12250 to 14000
7000 to 8750	14000 to 15750
8750 to 10500	15750 to 17500
10500 to 12250	> 17500



Analysis Limits

X 1632935 to 1633072
Y 1774483 to 1774622

Signal Statistics

Signal	Low	High	Mean	Std Dev
NaI 1x1	3540	92700	15736.41	10960.97

2.4 *Omega West Reactor Site, Tech Area 02*

This section of the report documents the USRADS surveys conducted in and adjacent to the Omega West Reactor compound near Los Alamos National Laboratory TA-02. The field surveys were conducted during the periods 24 and 25 August 00 and 06 through 20 October 00. Civil surveys were provided to translate the USRADS data into state plane coordinates.

Immediately outside the SE corner of the Omega West reactor site fence, there was a peak reading of 1,197,900 cpm during the 25 August 00 survey (1628662E, 174110N). This elevated location was remediated and was not evident during the re-survey completed on 17 October 00 (see T2ALL.jpg).

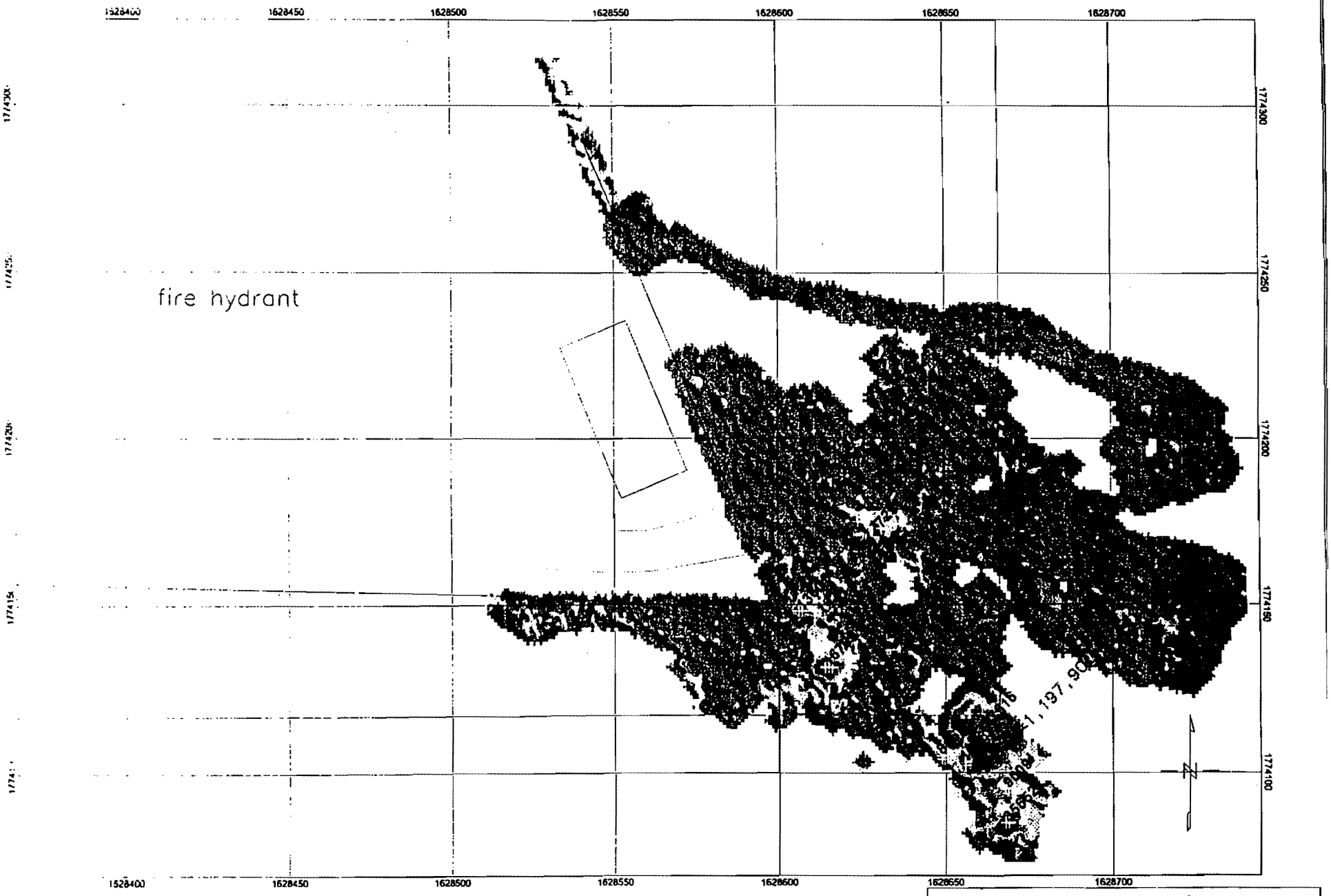
Electronic files and formats:

Merged field data	.dat	la043alc.dat
Comma separated values	.dat	alc_csv.dat
Colored shaded map	.jpg	AL_CG.jpg
Reacquisition sheet	.xls	AL_Cganom.xls

The survey of the Omega West Reactor Site during the period 06 through 16 October 00 indicated several areas of interest, the highest exceeding 200,000 cpm at 1628125.9E, 1774268.1N which is approximately 40 feet WSW of the SW corner of the reactor building.

Electronic files and formats:

Merged field data	.dat	T2allm.dat
Comma separated values	.dat	T2_csv.dat
Colored shaded map	.jpg	T2_ALL
Reacquisition sheet	.xls	T2anom.xls



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Omega Reactor Site, SE Gate Area
Nal 1x1 with USRADS
CHEMRAD LA043ALC.DAT August, 2000

POC	Easting (X)	Northing (Y)	cpm gamma	Reacquisition Notes
AL_CG-1	1628669	1774085	35652	
AL_CG-2	1628669	1774095	9009	
AL_CG-3	1628656	1774103	142692	
AL_CG-4	1628661	1774111	707616	
AL_CG-5	1628649	1774105	8662	
AL_CG-6	1628615	1774131	16799	
AL_CG-7	1628607	1774148	13601	
AL_CG-8	1628631	1774173	7291	
AL_CG-9	1628662	1774110	1197900	

Notes:

LOGGER Analyze v1.54m Track Map

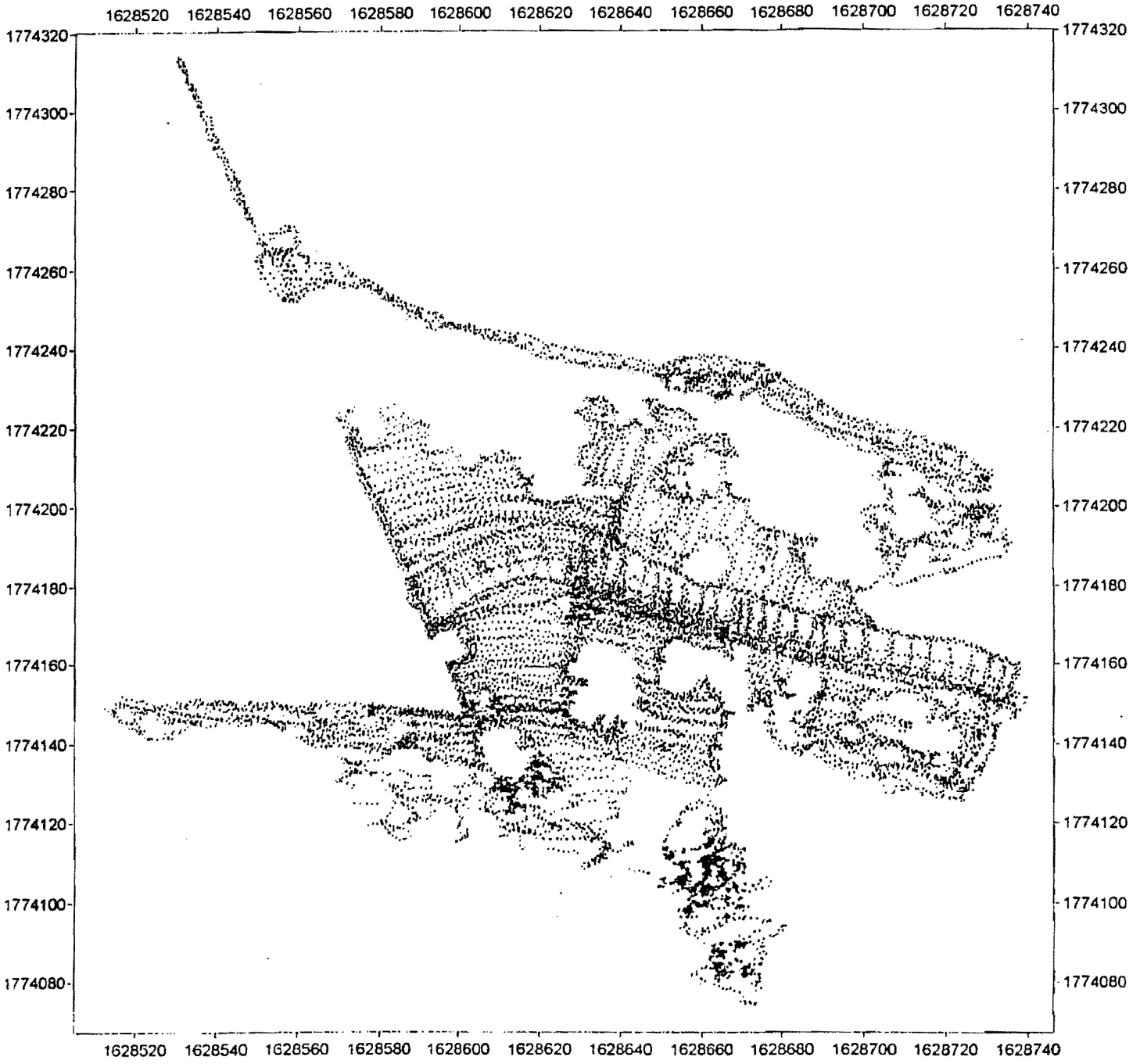
Site: LA043AL (C)

Signal: NaI 1x1 (cpm)

Time:

Threshold:
> 7000 •

< 7000
7000 to 8750
8750 to 10500
10500 to 12250
12250 to 14000
14000 to 15750
15750 to 17500
> 17500



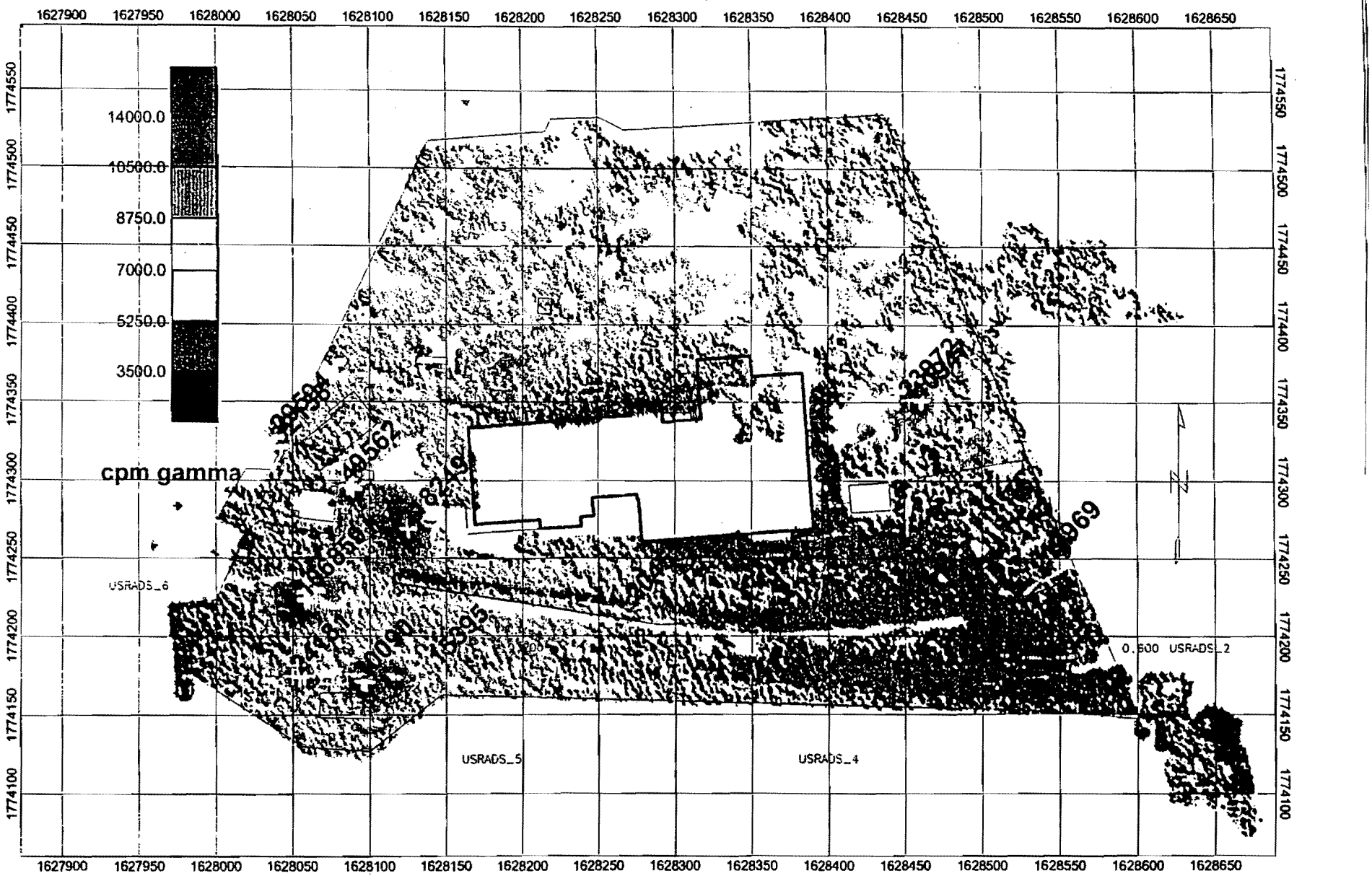
LOGGER Analyze v1.54m Site: LA043AL (C) Time:

Analysis Limits

X 1628512 to 1628740
Y 1774075 to 1774314

Signal Statistics

Signal	Low	High	Mean	Std Dev
NaI 1x1	2340	1197900	8511.895	47402.85
GM Pancake	0	13860	106.2897	295.7408



Scale 1:754.6428

25 0 25 50 75 100 125 150

feet

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Reactor Building Site, Tech Area 02
NaI 1x1 with USRADS
CHEMRAD T2ALLM.DAT 17OCT00

POC	Easting (X)	Northing (Y)	cpm gamma	reacquisition notes
T2-1	1628055.1	1774174.4	24181	
T2-2	1628096.3	1774170.4	30090	
T2-3	1628145.0	1774179.1	15395	
T2-4	1628274.5	1774220.6	20451	
T2-5	1628058.9	1774223.0	106859	
T2-6	1628125.9	1774268.1	218249	
T2-7	1628087.4	1774296.9	49562	
T2-8	1628042.5	1774321.0	32138	
T2-9	1628042.2	1774328.1	29594	
T2-10	1628452.9	1774351.1	23972	
T2-11	1628460.9	1774349.8	40947	
T2-12	1628544.4	1774246.8	17969	

Notes:

LOGGER Analyze v1.54m Track Map

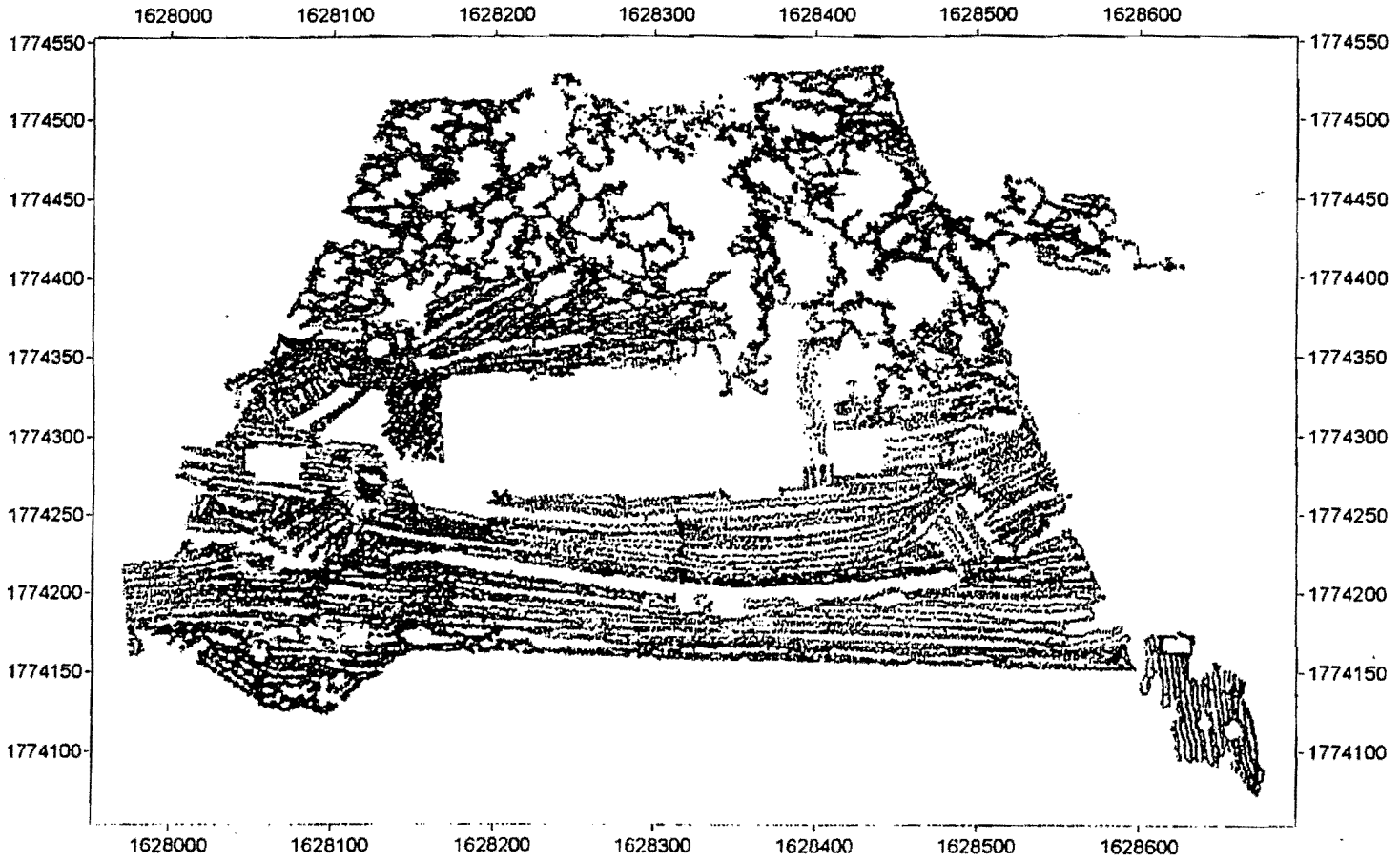
Site: T2ALLM ()

Signal: NaI 1x1 (cpm)

Time:

Threshold:
> 7000

< 7000	12250 to 14000
7000 to 8750	14000 to 15750
8750 to 10500	15750 to 17500
10500 to 12250	> 17500



LOGGER Analyze v1.54m Site: T2ALLM () Time:

Analysis Limits

X 1627971 to 1628676
Y 1774074 to 1774533

Signal Statistics

Signal	Low	High	Mean	Std Dev
NaI 1x1	0	260160	7096.981	5682.768

2.5 *Tech Area 41 Facility*

This section of the report documents the USRADS surveys conducted in or adjacent to the eastern portion of the Tech Area 41 facility near Los Alamos National Laboratory TA-41. The field surveys were conducted during the period 17 and 18 October 00. Civil surveys were not provided to translate the USRADS data into state plane coordinates. Therefore, the maps and data appear in CHEMRAD supplied local coordinates having a 0,0 origin at a nail located in the asphalt at approximately 125 feet SE of the SE corner of the largest building at Tech Area 41 (see T4M.jpg).

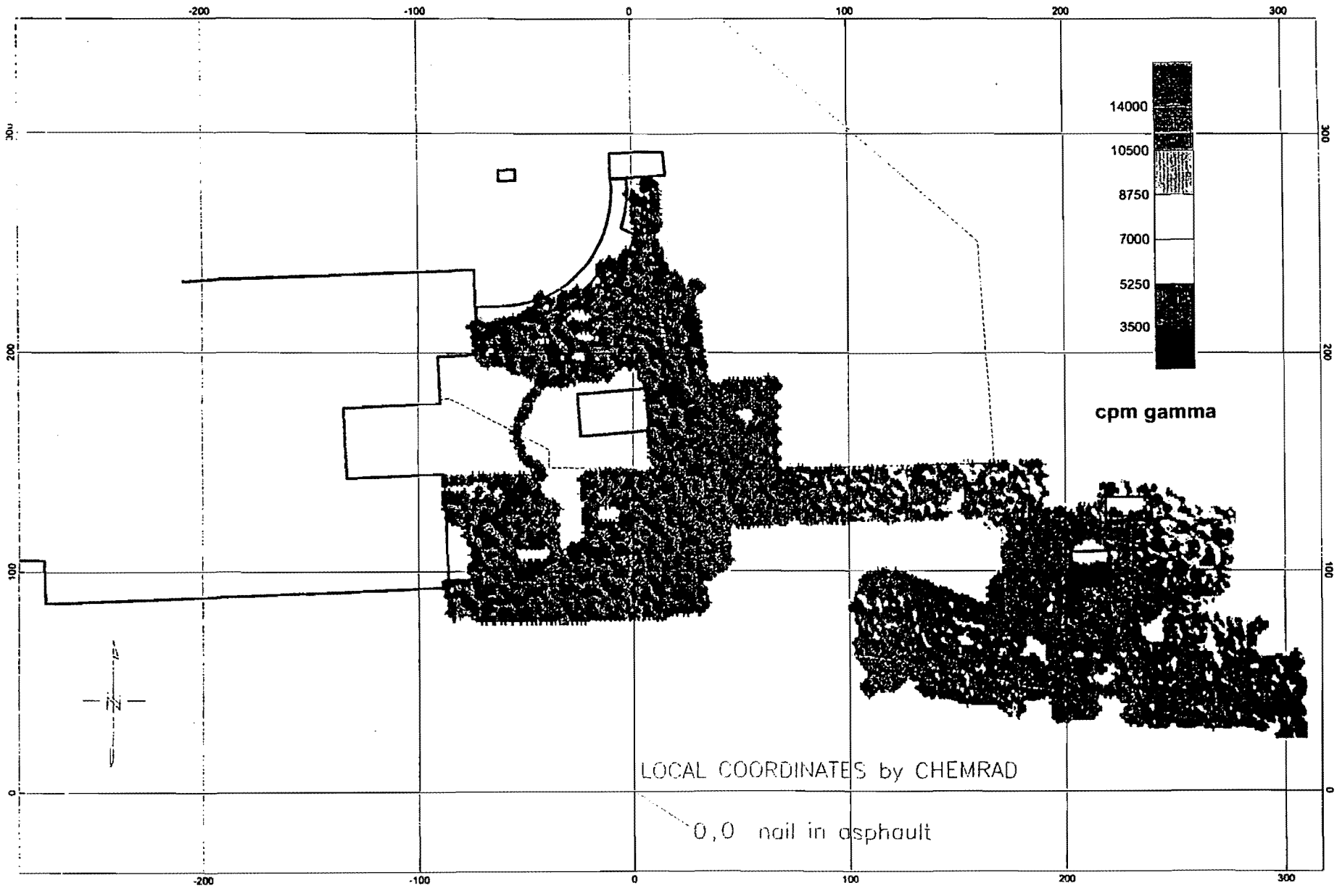
Surveys of the area east of Tech Area 41 buildings and the culvert and ditch adjacent to the gate did not reveal any areas of interest.

East side of facility electronic files and formats:

Merged field data	.dat	T4M.dat
Comma separated values	.dat	T4_m_csv.dat
Colored shaded map	.jpg	T4M.jpg
Reacquisition sheet	.xls	(none)

Electronic files and formats:

Merged field data	.dat	T4_ditch.dat
Comma separated values	.dat	T4_d_csv.dat
Colored shaded map	.jpg	(none)
Reacquisition sheet	.xls	(none)



Scale 1:419.3628

LANL - Washington Group

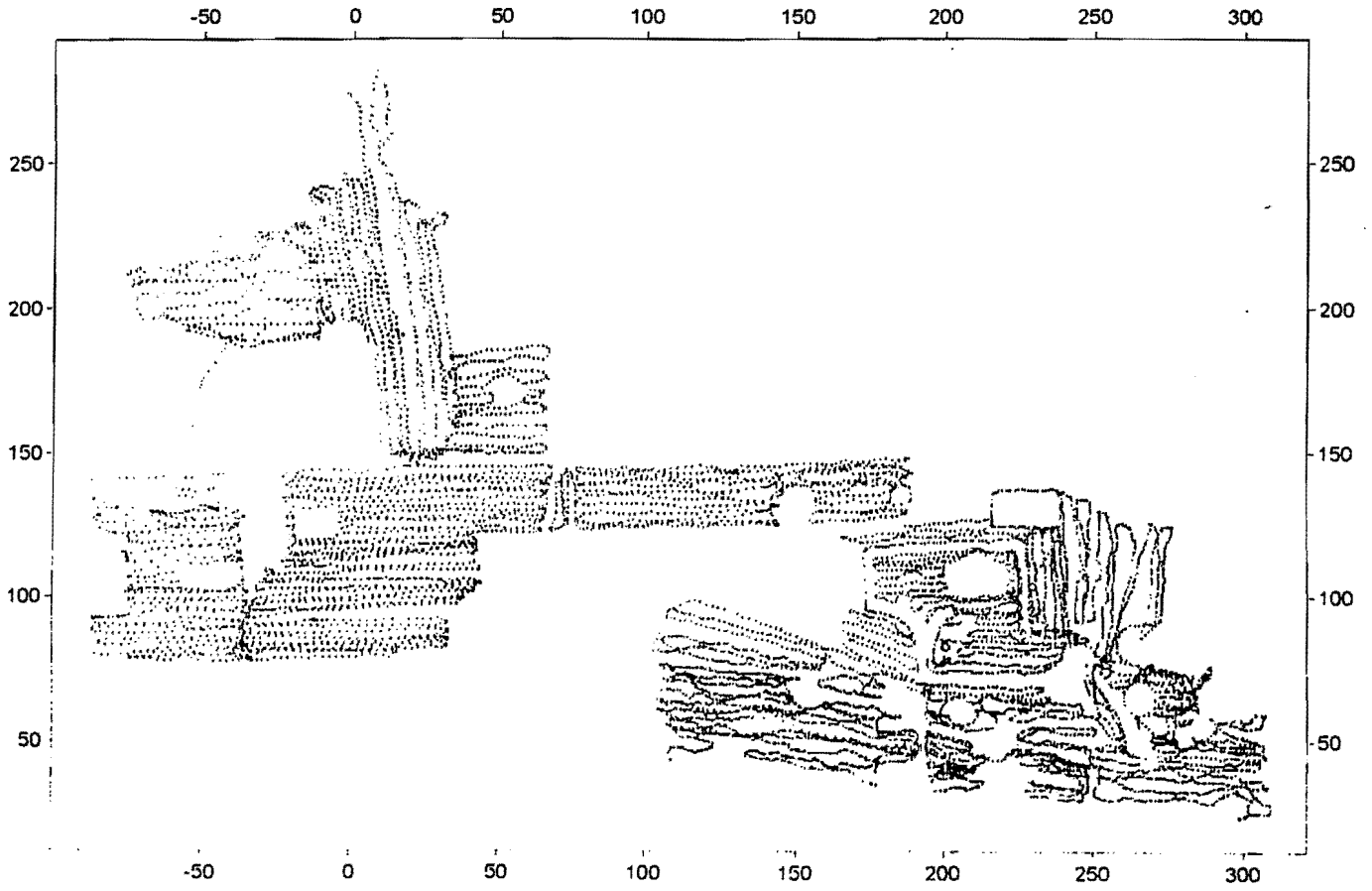
East Side of Tech Area 41 Buildings
NaI 1x1 with USRADS
CHEMRAD T4M.DAT 17&18OCT00

LOGGER Analyze v1.54m Track Map

Site: T4_M () **Signal: NaI 1x1 (cpm)** **Time:**

Threshold:
> 7000

< 7000	**12250 to 14000**
7000 to 8750	**14000 to 15750**
8750 to 10500	**15750 to 17500**
10500 to 12250	**> 17500**



Analysis Limits

X	-88.56	to	309.18
Y	23.64	to	280.89

Signal Statistics

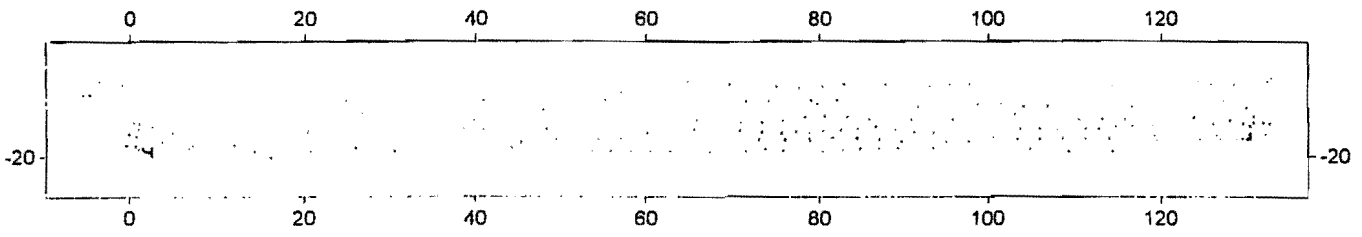
Signal	Low	High	Mean	Std Dev
NaI 1x1	1680	7320	4421.32	817.7157
GM pancake	0	40080	29.96969	674.9523
uR	0.882	371.786	1.430027	8.488217

LOGGER Analyze v1.54m Track Map

Site: T4_DITC (H) **Signal: NaI 1x1 (cpm)** **Time:**

Threshold:
> 7000 •

< 7000	**12250 to 14000**
7000 to 8750	**14000 to 15750**
8750 to 10500	**15750 to 17500**
10500 to 12250	**> 17500**



Analysis Limits

X	-5.99	to	132.73
Y	-20.89	to	-10.67

Signal Statistics

Signal	Low	High	Mean	Std Dev
NaI 1x1	2160	4680	3524.924	487.6126
GM pancake	0	0	0	0
uR	0.882	0.882	0.882	0

3.0 USRADS AND SURVEY INSTRUMENT CONFIGURATION

3.1 Description of the USRADS 2300 System

USRADS was used to automatically correlate survey instrument data with the geographical location of that data during the surveys. The USRADS survey team consisted of a minimum of two CHEMRAD personnel. One person, the surveyor, performed the actual walkover by carrying the radiation instrumentation and electronic data gathering and positioning equipment (the data pack) over the survey area. A second person, the operator, operated a mobile base station consisting of a host microcomputer and a master controller. The data collected by the data pack was transmitted to the base station master controller via radio frequency link (RF) each second.

USRADS incorporates three technologies:

1. Radio frequency (RF) communications are used for system timing and data transfer.
2. Ultrasonics are used to determine distance by propagation time of the ultrasonic signal.
3. Microcomputers are used to collect data, calculate distances, display data, store data, and reduce data.

USRADS utilizes an ultrasonic signal emitted from the surveyor's data pack at one-second intervals. At the same instant, an RF transmission is broadcast from the surveyor's data pack to the master controller. Since RF transmissions travel at the speed of light and are essentially instantaneous as compared to the speed of sound, the RF transmission is used to mark the start of the ultrasonic signal. Each stationary receiver has an ultrasonic receiver and an RF transmitter. When the stationary receiver receives the ultrasonic pulse, it transmits an RF signal. This RF signal is received by the master controller and is used as a stop signal for that particular stationary receiver, thus establishing the time-of-flight of the ultrasonic signal from the data pack to that stationary receiver's location. The microcomputer can then determine the distance between the surveyor and each stationary receiver's location. Through this method, the surveyor's exact location is established each second throughout each walkover.

The USRADS software automatically correlates the survey instrument data collected with the correct location of the surveyor. The location and corresponding data values are then plotted on a grid map displayed on the host computer.

The data for that one-second time period is also posted at the top of the computer screen. The plotted position remains on the computer screen while the data collected is replaced each second to conserve screen space for plotting the track of the surveyor. At any time during the survey, the operator may look at the surveyor's track lines to determine if any areas have been missed. The surveyor may return to any areas deemed insufficiently surveyed and obtain the necessary coverage.

When proper survey coverage has been accomplished, the operator runs the data reduction routines on the microcomputer. Several software routines enable the operator to review coverage and identify anomalies or other points of interest.

3.2 Color Track *Maps and Contour Plots*

3.2.1 Color Track Maps

Track maps are graphic illustrations of survey coverage produced during the USRADS surveys. The track maps correlate the detector signals to the surveyor's location as the survey is occurring using changing colors to indicate the different levels of the instrument readings. The color track maps show positions of the stationary receivers used (a diamond + symbol with the SR number adjacent), while the path taken by the surveyor is shown as a series of small dots and larger dots when an established threshold value is reached. For locations with data exceeding the selected threshold value, the surveyor's position is indicated by larger color-filled circle symbols on the track map.

The color track maps are generated on the computer display in real-time during the conduct of each USRADS walkover survey. The color track maps are valuable tools in identifying general trends and providing verification of findings while the survey is in progress. Copies of the color track maps are included with this report. Quality controls such as thoroughness of coverage, generally acceptable rates of increase (see below), clustering of color changes, and verification of suspect findings by adjacent tracks are performed visually by the computer operator during the conduct of the survey.

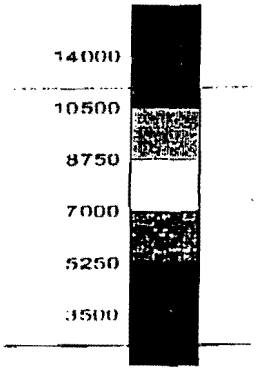
"Generally acceptable rates of increase" refers to readings that increase as a surveyor approaches a radioactive source and decrease as the surveyor passes the source of elevated readings. These readings are confirmed by a gradual increase/decrease on adjacent tracks. Suspect readings frequently are indicated by localized increases in magnitude without a gradual increase/decrease or confirmation on adjacent passes.

At the conclusion of the survey, the survey data is replayed to verify data integrity. Color track map nomenclature is as follows:

Survey	*Map Title*	*Meaning*
Gamma Rad. Readings	"NaI (cpm)"	1x1 Sodium Iodide (counts per minute)

3.2.2 Track Map Threshold Level

The threshold cutoff was used to set the level at which the location symbol on the track map changed from a small dot to a large color-filled circle. Nominally, and for the sake of visual consistency across the survey campaign, 7,000 cpm was used for the threshold value. Thus, the level threshold was useful in identifying locations with elevated measurements.



3.2.3 Track Map Color Codes

Color codes are set to increasing measurement values, generally indicated by black, dark blue, green, light blue, yellow, orange, red, and magenta on color track maps. The levels associated with these colors are documented on each plot.

3.3.4 Color Shaded Relief Maps (and Reacquisition Sheets)

Color shaded relief maps are included for all of the sites surveyed. These plots provide a graphic illustration of the contours of radiation levels detected. The color contours generally used for contour maps are, in increasing order: dark blue, green, light blue, yellow, orange, red, and magenta.

Nominally, and for the sake of visual consistency across the survey campaign, 7,000 cpm was used for the threshold value. This normally represents transition in color from green to yellow on the color-shaded relief map.

The posted values on the color-shaded relief maps are derived from ***gridded*** data. The coordinates for the posted values are supplied on the companion reacquisition sheet.

3.3 Radiological Instrumentation Used In the Canyon Surveys

3.3.1 Man-Carried Survey Instrumentation

The walkover radiological characterizations of the Canyon sites were conducted with a Model 44 -2, 1"x 1" sodium iodide (NaI) detector probe coupled to a Ludlum Model 3 count rate meter. The rate meter was interfaced to the USRADS data pack. The data, which was accumulated for each one-second interval, was transmitted to the host computer with the corresponding USRADS position information for that second.

The probe was suspended from the surveyor's right hand by a strap in order to keep the probe in close proximity to the surface (within 15 cm) while scanning. The detector was typically held to the right side of the body beneath the USRADS ultrasonic transducer to obtain accurate position. The surveyor generally moved forward along the survey transects at approximately 2.5 feet per second on parallel transects separated by approximately 5 feet.

In addition to the normal walkover radiation survey protocol, a limited number of static measurements were performed at designated locations for quality assurance purposes. Readings were taken with the detector probe in contact with the surface.

3.3.2 Instrument Calibration and Response Checks

The radiation instrumentation was calibrated prior to initiating the surveys. Calibrations were coordinated by CHEMRAD and records are retained at CHEMRAD's Oak Ridge office. Each radiation survey instrument received a daily response check prior to use in the field. This daily response check included battery checks and a source check. All daily response checks were performed at the individual sites using a ^{137}Cs source.

3.3.3 Background Readings

CHEMRAD performed reference and response check readings before and during the surveys for reference purposes. USRADS was used to electronically record these readings. Prior to and after the conduct of the USRADS surveys, 300-second background readings were taken.

3.3.4 Source Response Checks

Response checks were performed with the probe in contact with a ^{137}Cs source before and after each survey day. The mean value of the net count rates from the morning and the afternoon results were used to calculate the ^{137}Cs efficiency of the NaI probe. All values were determined to be within +/-10% of the initial day's source response checks.

4. *USRADS SURVEY AND PRESENTATION PROTOCOLS*

4.1 *Radiation Survey Methodology*

During the radiation survey the grid was traversed at approximately 2.5 feet per second on parallel transects spaced approximately 5 feet center to center for walking surveys.

Surveys were typically conducted in the following manner:

1. CHEMRAD survey teams arrived on site.
2. The CHEMRAD field survey supervisor analyzed the site for the best deployment of survey equipment.
3. Stationary receivers were deployed in standard CHEMRAD manner with adaptation for the terrain and obstacles that were site-specific.
4. Stationary receiver coordinates on fixed reference points (grid stakes) were entered into the host computer.
5. Site setup was then performed to determine the location of stationary receivers with 30-second counts at each stationary receiver.
6. The radiation instruments were mounted on the surveyor.
7. A 60-second count at a known point was taken to record the "quality check" data.
8. When the 'quality check' was completed, the surveyor moved to a starting point to begin the survey.
9. When the survey day was completed, the surveyor returned to the quality check point to perform a 60-second redundancy check.
10. The survey data was then analyzed to determine the quality and completeness of the data and to determine whether bias points should be established.
11. If bias points were required, the surveyor moved to the determined bias points and performed a 60-second static count.
12. Data was copied to diskette for processing at the CHEMRAD offices.
13. Equipment tear down was performed.
14. The CHEMRAD survey crew then departed to the next survey site.

4.2 Explanation of Data

The USRADS walkover radiation, surveys were conducted on a survey grid basis. Grid and survey prefixes identify specific sites:

LA	denotes LA Canyon
DP	denotes DP Canyon
T2	denotes Tech Area 02 (Omega West)
T4	denotes Tech Area 41
MO	denotes Mortandad

Survey nomenclature for subsequent radiation traverses in the same area were usually identified as A, B, or C

on survey files.

The above is consistent with the data plots and files previously submitted. This naming convention is also used in the color track maps included in this report.

4.3 *Problems Encountered During the Survey*

Environmental, site, and equipment problems may impact USRADS surveys. Approximately 1.5 days were lost during the phases due to extreme weather conditions. The CHEMRAD team left the area during the forest fire in the spring.

None of the site conditions encountered interfered with equipment operation. In some areas, dense with briars and thickets impeded thorough surveys. Even in these situations, the equipment tracked the surveyor around or through the limited access areas.

No equipment operational problems were encountered following initial startup. There were sufficient civil survey points to support USRADS data collection in site coordinates either for the conduct of field operations or later for replay of the surveys into state plane coordinates. No civil survey points were supplied for the work at the Tech Area 41 facility (no areas of interest detected).

5. *QUALITY CONTROL*

5.1 *General Considerations and Quality Objectives*

Data quality objectives for the Canyon survey project were established to meet particular contractor requirements in addition to CHEMRAD's own in-house requirements. Quality control measures were implemented throughout the CHEMRAD survey process to prevent the introduction of unreliable data. Some particular organizational objectives of the CHEMRAD quality assurance/quality control (QA/QC) program were designed to:

1. Identify problems that affect quality of the CHEMRAD survey results.
2. Prepare a systematic process to provide solutions for any problems relating to quality issues.
3. Ensure implementation of solutions, with monitoring of problem resolution until corrected.

Some specific quality control measures taken throughout the survey phases include:

1. Quality and redundancy measurements each day to ensure the ability to reproduce data. If the measurements were not within CHEMRAD's allowable margin of error, a determination of the cause of the difference was made.
2. Real time, ongoing monitoring of the survey and the individual data channels by the computer operator to note any discrepancies in the data as soon as possible.
3. Cross-check routines of stationary receiver locations to confirm accuracy of the surveyor's coordinates.
4. Daily checks of radiological and geophysical instruments to verify accuracy of data readings.
4. Analysis of the survey data generated to determine any failure of the CHEMRAD survey routine.
5. Review and analysis of the data by CHEMRAD's senior geophysicist and instrumentation engineer.

5.1.1 *Precision*

According to Environmental Protection Agency guidelines, precision is defined as the measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision is best described in terms of standard deviation. Various measures of precision exist depending upon the "prescribed similar circumstances."

Quality and redundancy (Q&R) measurements were taken by the USRADS equipment each day to insure the precision of the data. For Q&R readings, a location was selected to collect initial integrated counts for all instruments prior to the conduct of surveys. Upon conclusion of the survey day, this position was reacquired and another integrated count was made to provide a redundant check on each of the instruments and the data compared. If the measurements were not within acceptable limits, the cause of the discrepancy was determined. Corrective actions, if necessary, were taken to assure that precision was maintained throughout the conduct of the USRADS surveys. If readings varied by more than ±20 percent from the Q&R mean readings, CHEMRAD first determined which instrument or instruments were not within the acceptable range. If it was determined that a pancake or NaI detector had malfunctioned, the instrument was repaired or replaced, and the grid site was resurveyed.

The USRADS operator observed the incoming data stream along with the graphic display of the track map data during the conduct of the surveys. In this manner, data taken sequentially and on adjacent paths were readily compared to assure mutual agreement among the individual measurements along a path, on adjacent paths, and in regions where clustering may be indicative of findings of interest.

CHEMRAD utilized daily response checks for its radiological instrumentation at the beginning of each survey day to ensure precision (see section 3.2, Instrument Calibration, Background and Response Checks). If any instrument deviated more than ±10 percent, the survey meter was removed from service until the problem was corrected.

5.1.2 Accuracy

According to Environmental Protection Agency guidelines, accuracy is defined as the degree of agreement between the observed measurement value and the true value. Instrument accuracy was verified by submitting the instruments to calibration prior to the initiation of the work and resubmitting on a frequency not to exceed six months. CHEMRAD radiological instruments were calibrated to known radiation sources that were calibrated to an NIST (National Institute for Standards and Testing) referenced source.

Positional accuracy was assured by use of the initial USRADS setup procedures that automatically calibrate the system for the speed of sound, consistent with the current meteorological conditions at the site.

Quality controls such as thoroughness of coverage, generally acceptable rates of increase (see below), clustering of color changes, and verification of suspect findings by adjacent tracks are performed visually by the computer operator during the conduct of the survey.

"Generally acceptable rates of increase" refers to readings that increase as a surveyor approaches a radioactive source and decrease as the surveyor passes the source of elevation. These readings are confirmed by a gradual increase/decrease on adjacent tracks. Suspect readings frequently are indicated by localized increases in magnitude without a gradual increase/decrease or confirmation on adjacent passes

5.1.3 Completeness

According to Environmental Protection Agency guidelines, completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct normal conditions.

CHEMRAD attempted to meet or exceed all standards of completeness for its data collection. Data readings were recorded each second during the survey to provide a very complete characterization of the areas surveyed. Omissions of data occurred in areas where access was handicapped by geographic or physical obstacles (heavy undergrowth, steep banks, structures, etc.) that had to be circumvented, or areas where it was deemed hazardous to the health and safety of the surveyor.

CHEMRAD determined completeness of data by requiring a prescribed survey methodology as determined in the Statement of Work, CHEMRAD's own internal requirements, and frequent meetings with the prime contractor. Data were monitored in the field and as processed. Some specific actions taken by CHEMRAD included:

1. Analysis of each grid site prior to each survey by a trained CHEMRAD field team supervisor to determine necessary and applicable survey procedures to ensure complete and thorough surveys of each site.

2. Review of the survey tracks by the survey operator as they were generated during the survey.
3. Comparison of the survey track maps with aptitude maps of the survey area.

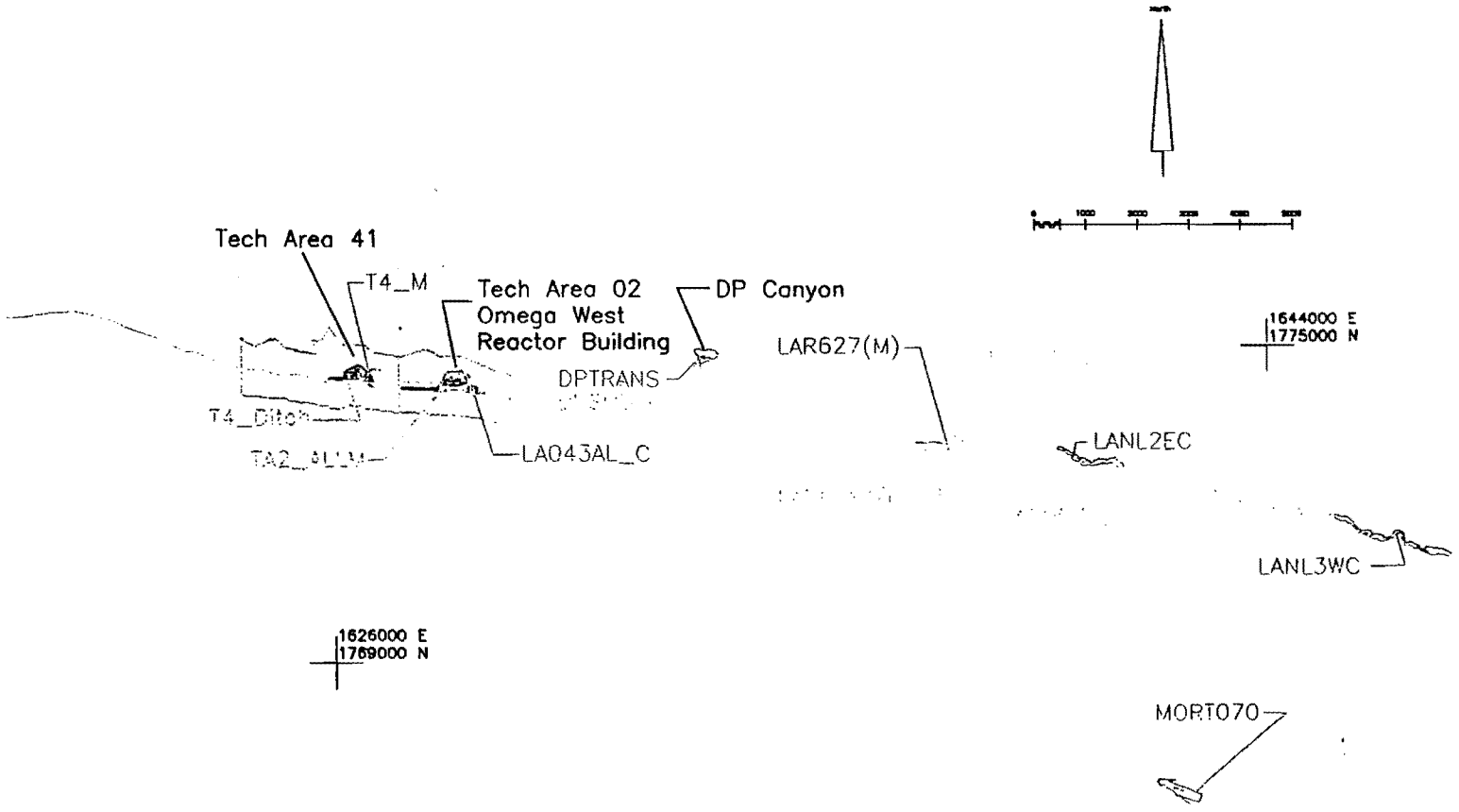
5.1.4 *Representativeness*

According to Environmental Protection Agency guidelines, representativeness expresses the degree to which data represent the medium/environment where samples/measurements were obtained. CHEMRAD's methodology ensures representativeness by taking readings every second during the survey. When the color track maps are assembled, adjacent tracks produce readings to confirm the representativeness of the survey information.

5.1.5 *Comparability*

According to Environmental Protection Agency guidelines, comparability expresses the confidence with which one data set may be compared to another. Some methods CHEMRAD uses to provide comparability are:

1. Survey methodology was consistent throughout the survey phases.
2. Data reduction software routines were consistent throughout the survey.



YEAR 2000 SURVEYS

Los Alamos National Laboratory

Tech Area 41, Tech Area 02, LA Canyon, Mortandad, & DP Canyon

CHEMRAD

2K_surveys.dwg

sources: Washington Group .dxf files
CHEMRAD surveys

Analysis Limits

X 1641825 to 1642681
Y 1766259 to 1766713

Signal Statistics

Signal	Low	High	Mean	Std Dev
NaI 1x1	2820	7200	4803.46	579.0171